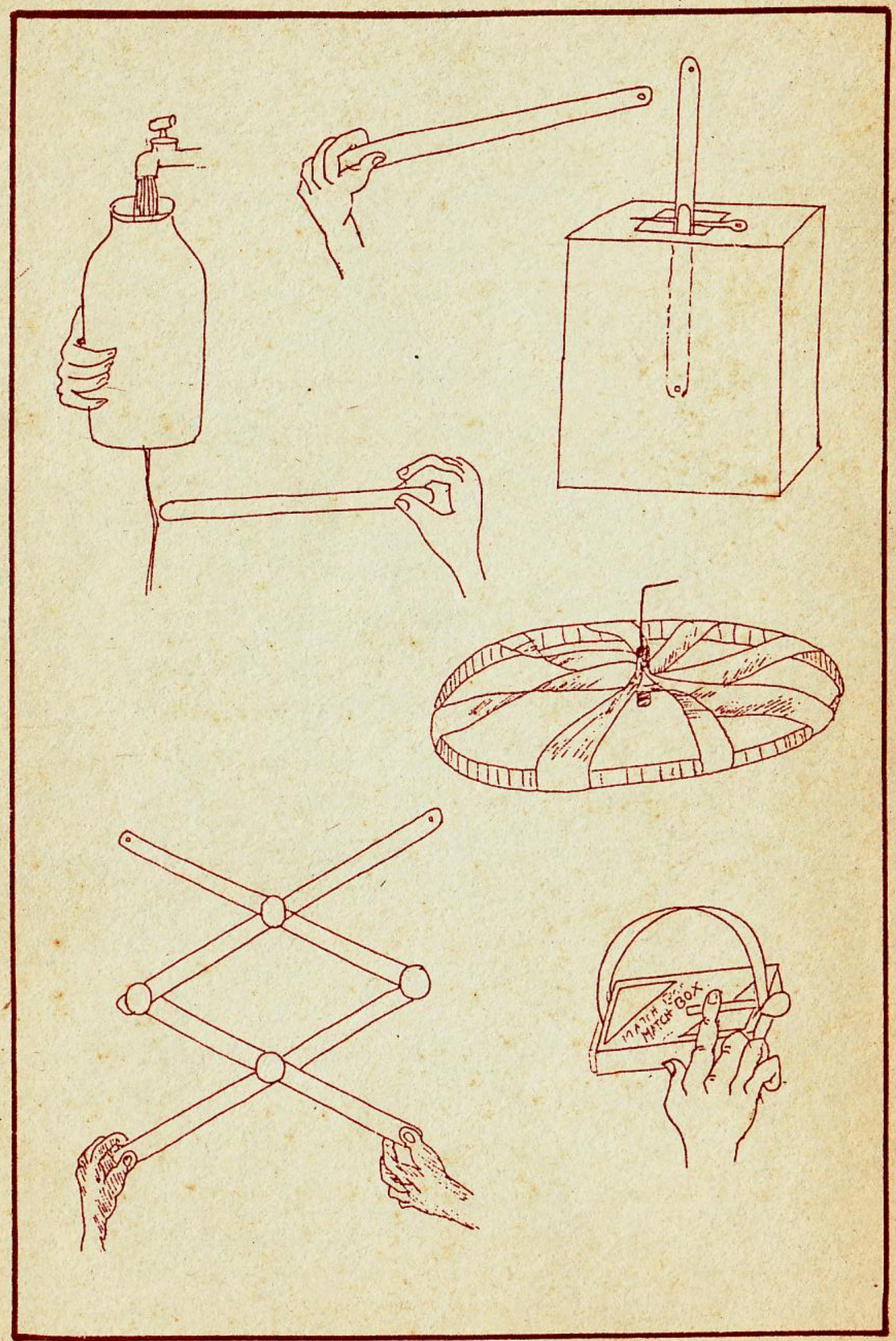
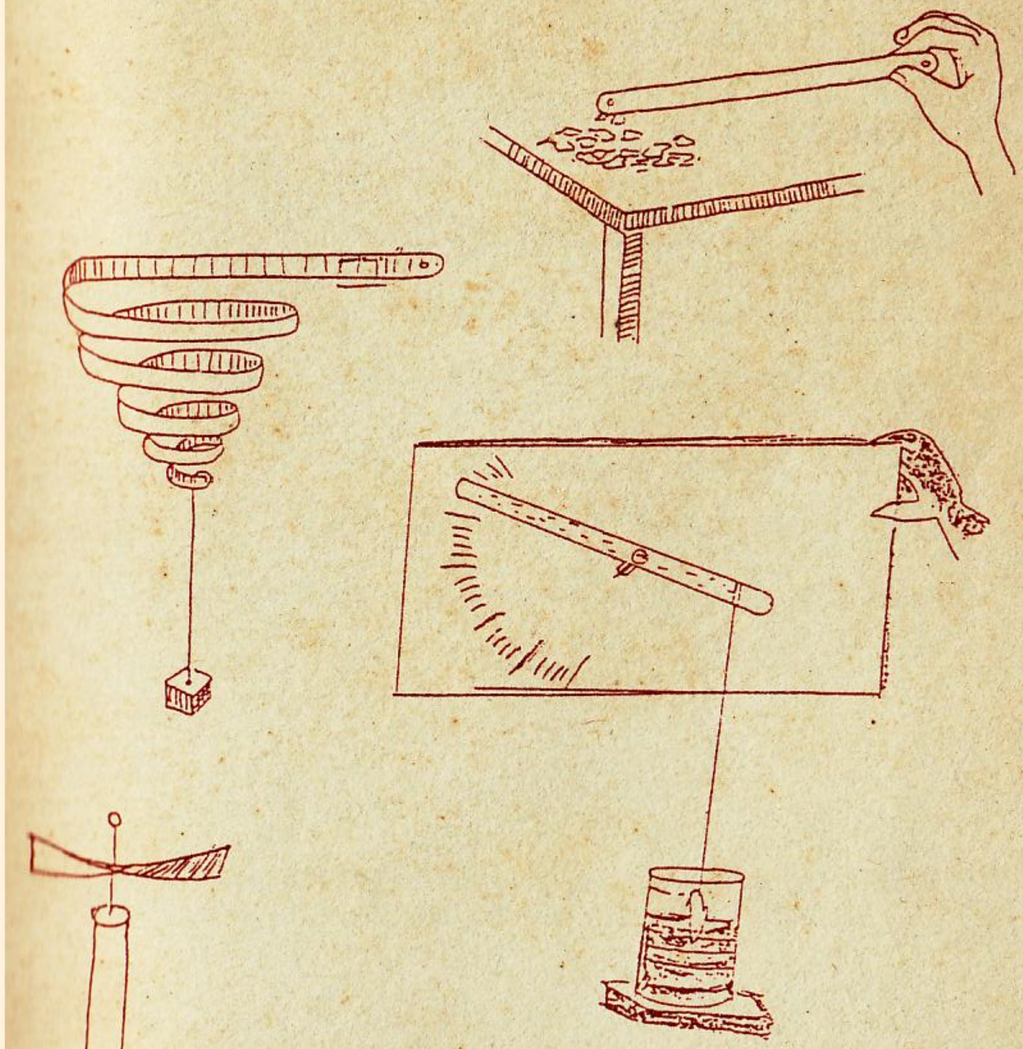
Science Activities with Plastic Tongue Cleaners





Resource Centre
LCTA -MHRD Project
KRISHNAMURTI FOUNDATION INDIA
VARANASI (U.P.) 221001
APRIL - 1993

SCIENCE ACTIVITIES WITH PLASTIC TONGUE CLEANERS

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(APRIL '1993)

PREFACE

For learning science effectively,the importance of direct experience with objects & materials by children can not be denied. It is quite essential that the children should be allowed to handle and manipulate materials & objects themselves to develop their creative,exploratory and inventive potentials.Therefore it follows that materials & objects are to be made available to the child without any hinderance. The more inexpensive and readily available the materials, the better it is.

It is also being exceedingly felt that an elaborate and expensive equipment is generally worthless for the child as it obtrusively intervenes between him and his urge for direct exploration of real things & materials. Thus for small children there is a positive virtue if, inexpensive and readily available, familiar materials are used for doing science rather than unfamiliar laboratory apparatus and equipments.Many such materials are around us that cost almost nothing or many of them can even be obtained from junk, waste, throw-aways and discarded things.

The present volume"Science activities with Plastic tongue cleaners" has twenty-four activities which will help the child to know the property of material in its many facets.It will also help him to perform activities and get a feel for doing science including low-level technology & designing.
The activities described in this booklet can also be done at home by children besides in the school. Many activities may serve as demonstrations for the teacher to clarify some science concepts.
Hope the users will find this booklet educationally beneficial for propogating the method of science.

Dr.Lalit Kishore
(Project Director)

April,1993

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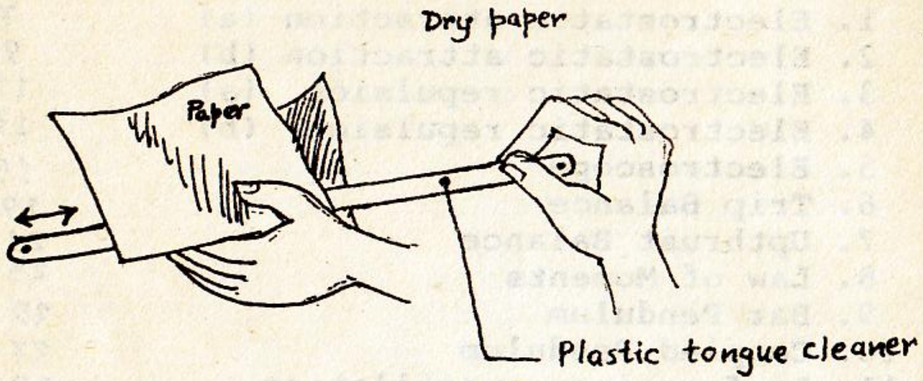
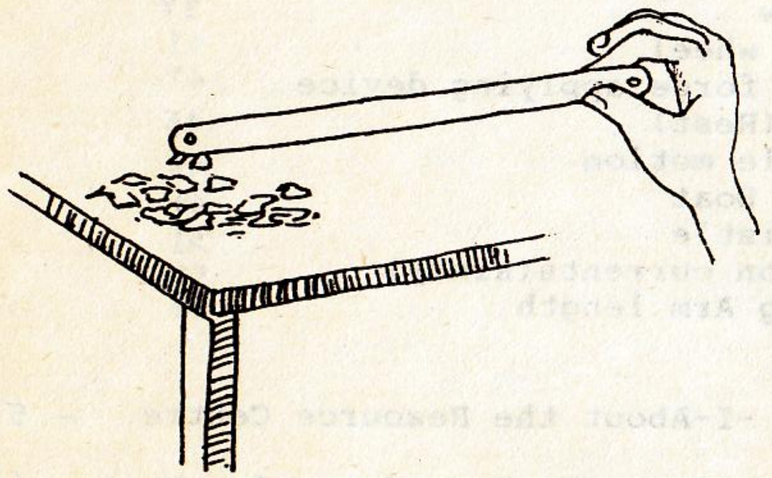




ACTIVITY - 1

Materials Required :

S.No.	Materials	Specification	Quantity
1.	Plastic Tongue Cleaner	Full size	1
2.	Paper	Note Book size	1
3.	Paper bits	--	10-15 pieces

Instructions :

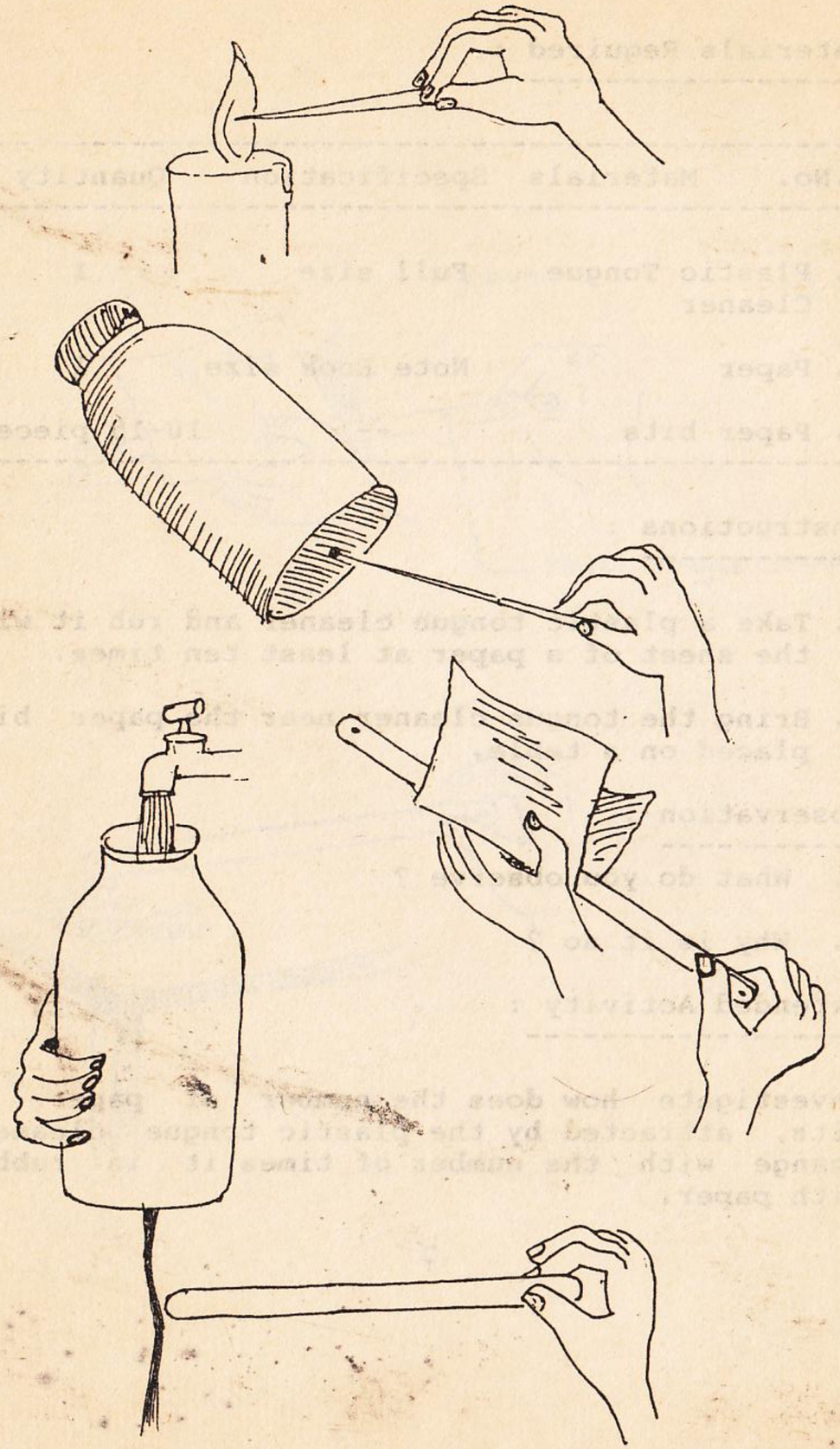
1. Take a plastic tongue cleaner and rub it with the sheet of a paper at least ten times.
2. Bring the tongue cleaner near the paper bits placed on a table.

Observation :

1. What do you observe ?
2. Why is it so ?

Extended Activity :

Investigate how does the number of paper bits, attracted by the plastic tongue cleaner, change with the number of times it is rubbed with paper.



ACTIVITY - 2

S.No.	Materials	Specification	Qty
1.	Candle	-	1
2.	Needle	-	1
3.	Plastic bottle	-	1
4.	Paper	Note book size	1
5.	Plastic tongue cleaner	Full size	1

Instructions :

1. Light the candle and heat the tip of needle in its flame.
2. Poke the hot tip of the needle at the centre of the bottle of plastic to make a hole.
3. Place the bottle under the tap & adjust the flow so that water doesn't spill over. You will see a thin stream of water coming out of the hole.
4. Rub the plastic tongue cleaner with the paper at least ten times.
5. Bring the rubbed plastic tongue cleaner near the stream of water coming out of the plastic bottle.

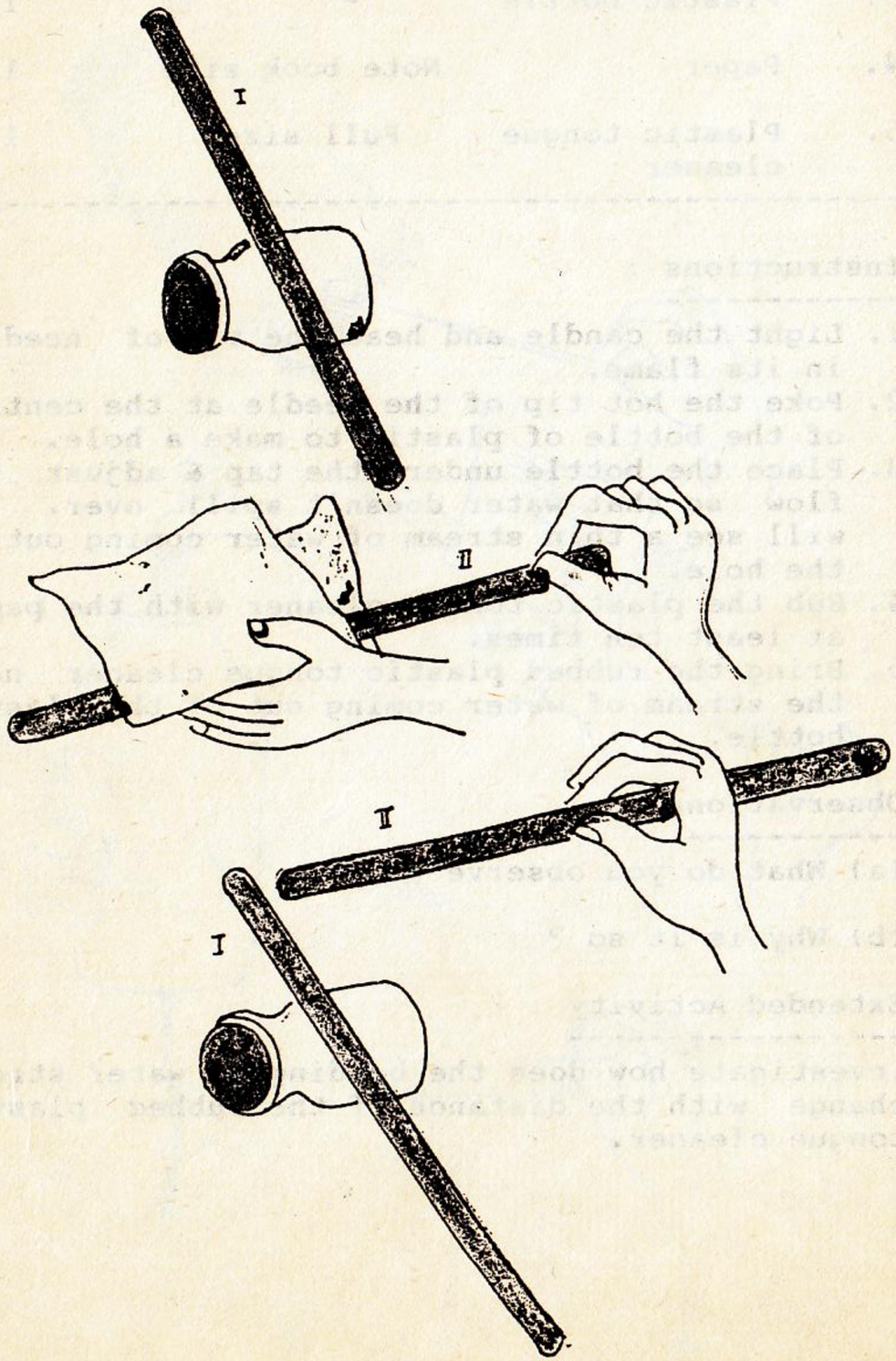
Observations :

(a) What do you observe ?

(b) Why is it so ?

Extended Activity :

Investigate how does the bending of water stream change with the distance of the rubbed plastic tongue cleaner.



ACTIVITY - 3

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full size	2
2.	Paper	Note book size	1
3.	Bottle	Glass (small)	1

Instructions :

1. Take the plastic tongue cleaner and rub it within the folds of the paper at least ten times.
2. Lay the bottle on its curved side and balance the rubbed plastic tongue cleaner on it.
3. Take the second plastic tongue cleaner and rub it within the folds of a paper at least ten times.
4. Bring the second plastic tongue cleaner near the end of the first tongue cleaner.

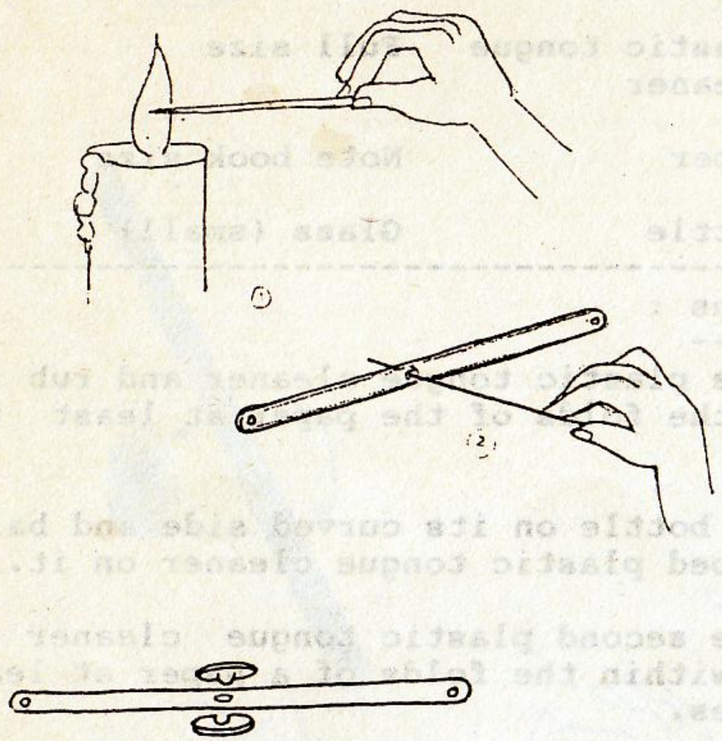
Observations :

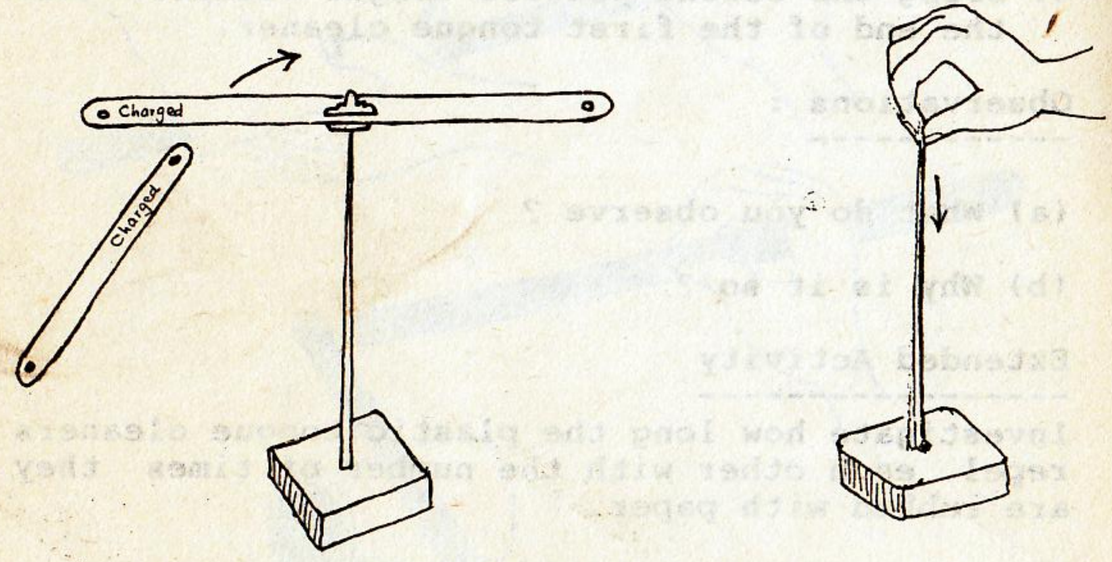
(a) What do you observe ?

(b) Why is it so ?

Extended Activity

Investigate how long the plastic tongue cleaners repel each other with the number of times they are rubbed with paper.





ACTIVITY - 4

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full size	2
2.	Press buttons	Small Size	1
3.	Needle	Long darning needle	1
4.	Eraser	--	1
5.	Candle	--	1
6.	Paper	Note book size	1

Instructions :

1. Light the candle and heat the tip of the darning needle in its flame.

2. Poke the tip of the needle through the mid-point of the plastic tongue cleaner to make a hole.

3. Press the two parts of the button through the hole to make a pivot.

4. Pierce the darning needle into the eraser so that it stands upright.

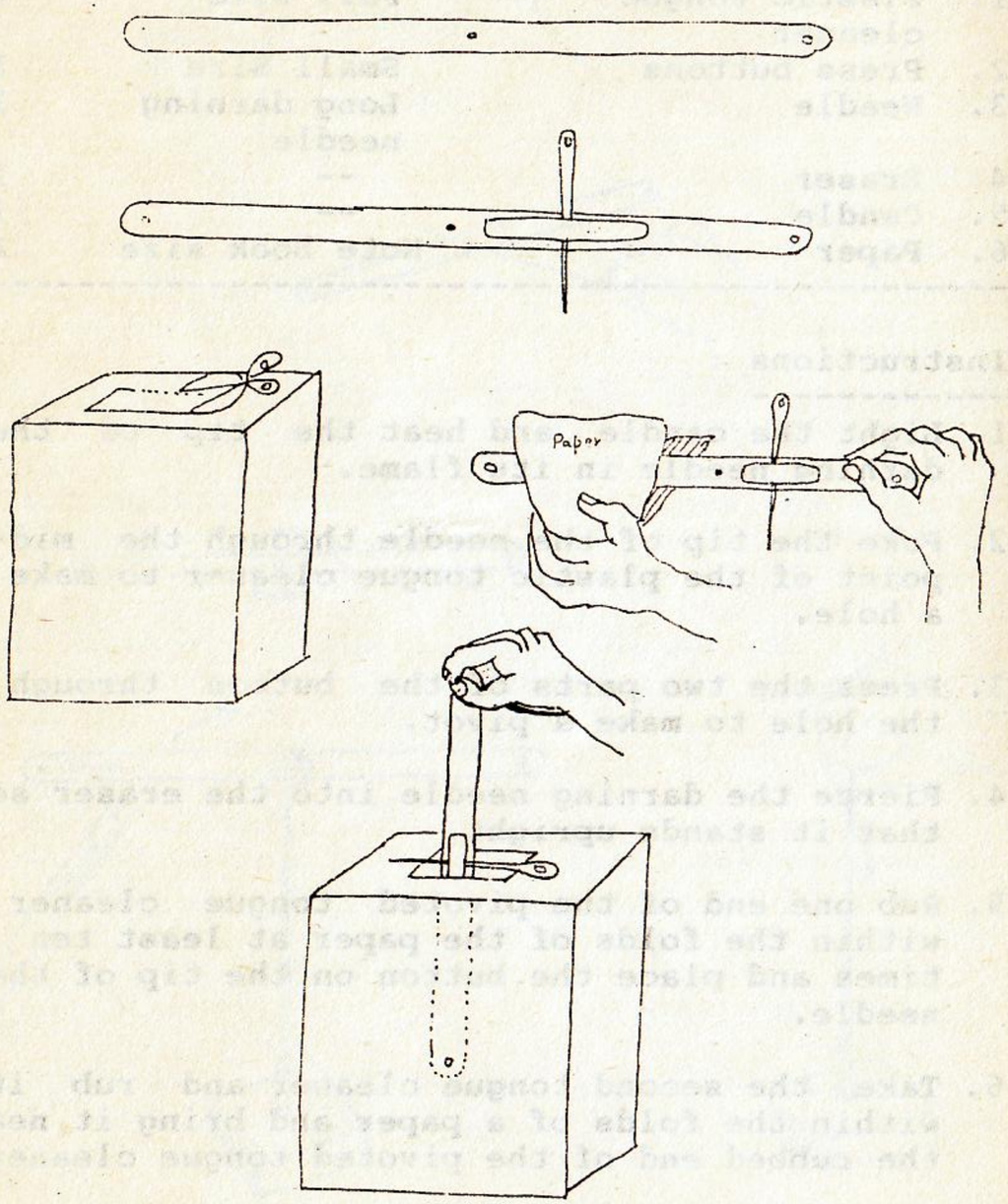
5. Rub one end of the pivoted tongue cleaner within the folds of the paper at least ten times and place the button on the tip of the needle.

6. Take the second tongue cleaner and rub it within the folds of a paper and bring it near the rubbed end of the pivoted tongue cleaner.

Observations :

What do you observe ?

Why is it so ?

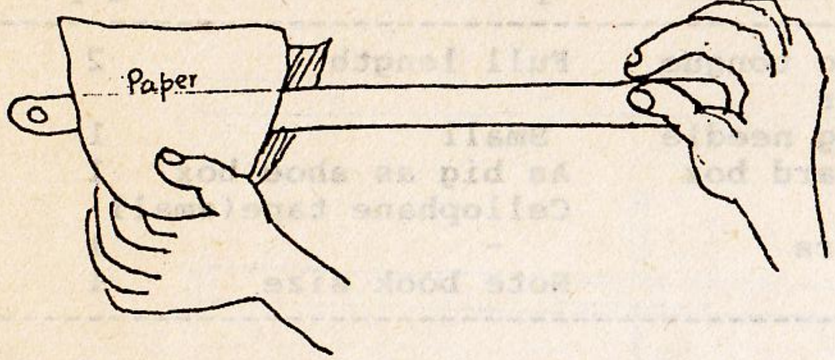


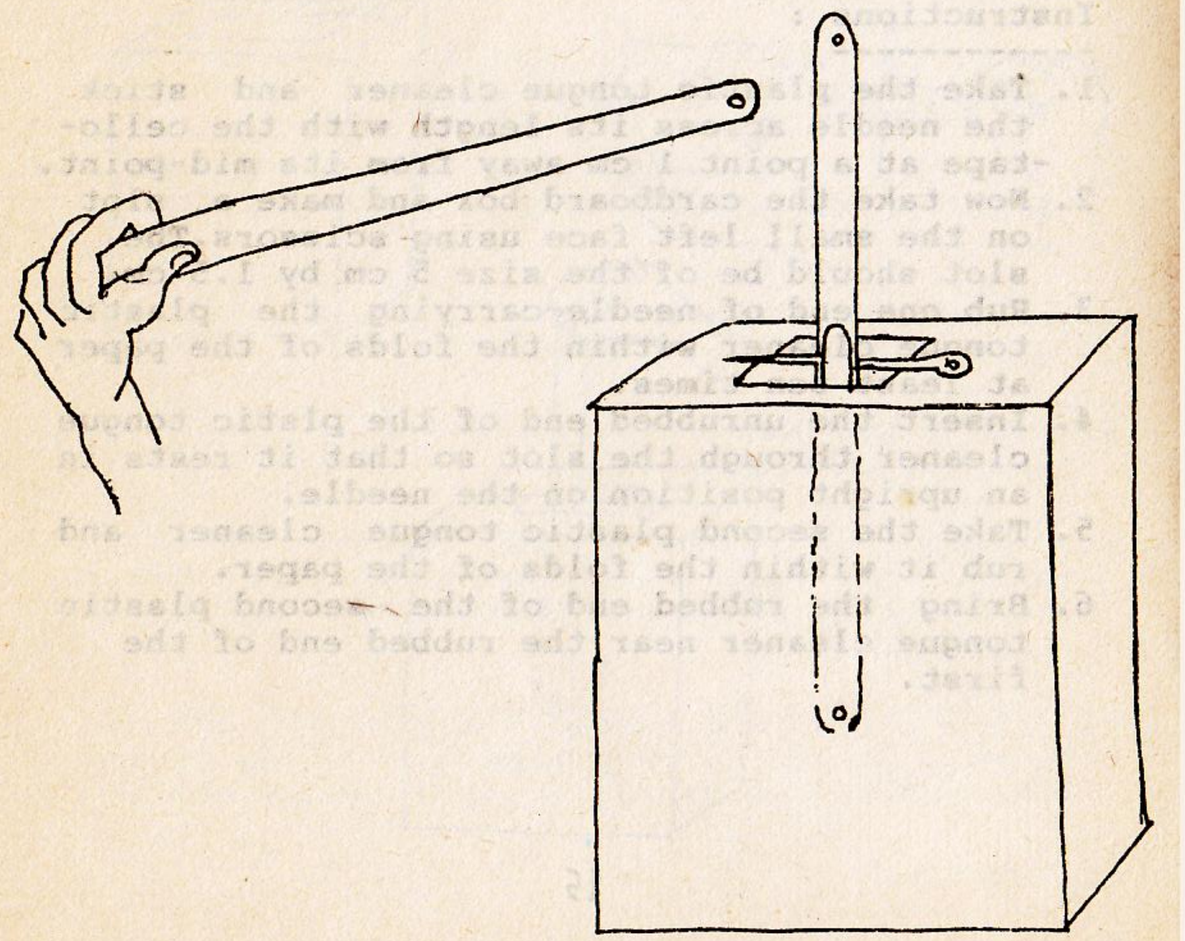
ACTIVITY - 5

S.No.	Materials	Specifications	Qty.
1.	Plastic tongue cleaner	Full length	2
2.	Darning needle	Small	1
3.	Cardboard box	As big as shoe box	1
4.	Tape	Cellophane tape(small)	
5.	Scissors	-	1
6.	Paper	Note book size	1

Instructions :

1. Take the plastic tongue cleaner and stick the needle across its length with the cello--tape at a point 1 cm away from its mid-point.
2. Now take the cardboard box and make a slot on the small left face using scissors.The slot should be of the size 5 cm by 1.5 cm.
3. Rub one end of needle-carrying the plastic tongue cleaner within the folds of the paper at least ten times.
4. Insert the unrubbed end of the plstic tongue cleaner through the slot so that it rests in an upright position on the needle.
5. Take the second plastic tongue cleaner and rub it within the folds of the paper.
6. Bring the rubbed end of the second plastic tongue cleaner near the rubbed end of the first.





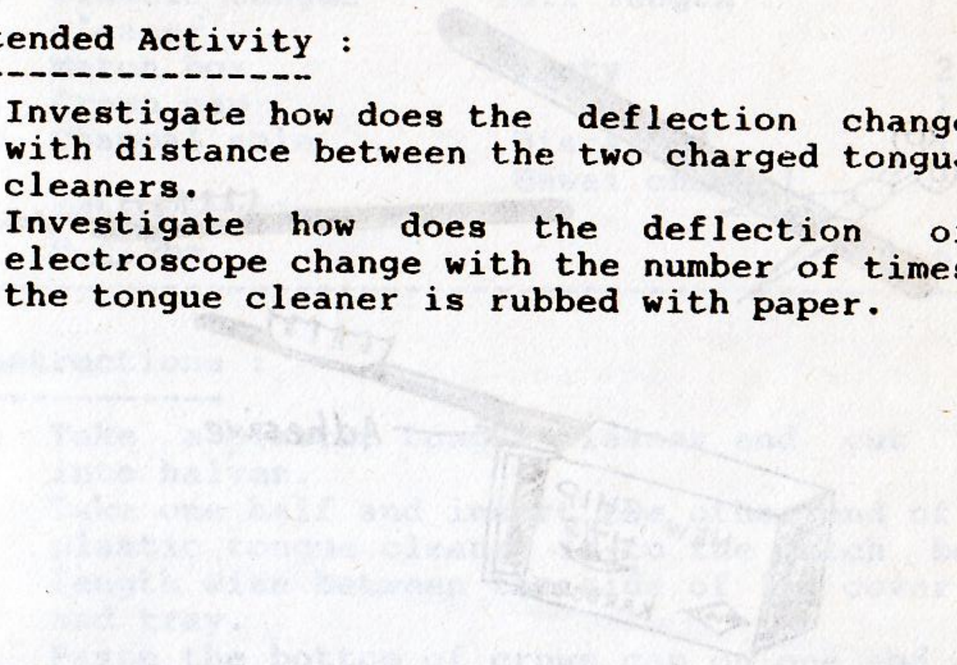
Observation :

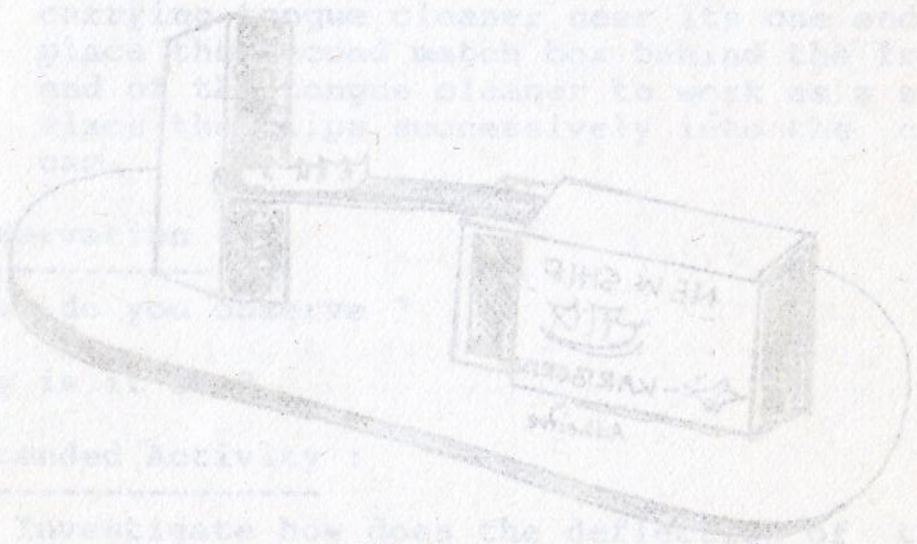
(a) What do you observe ?

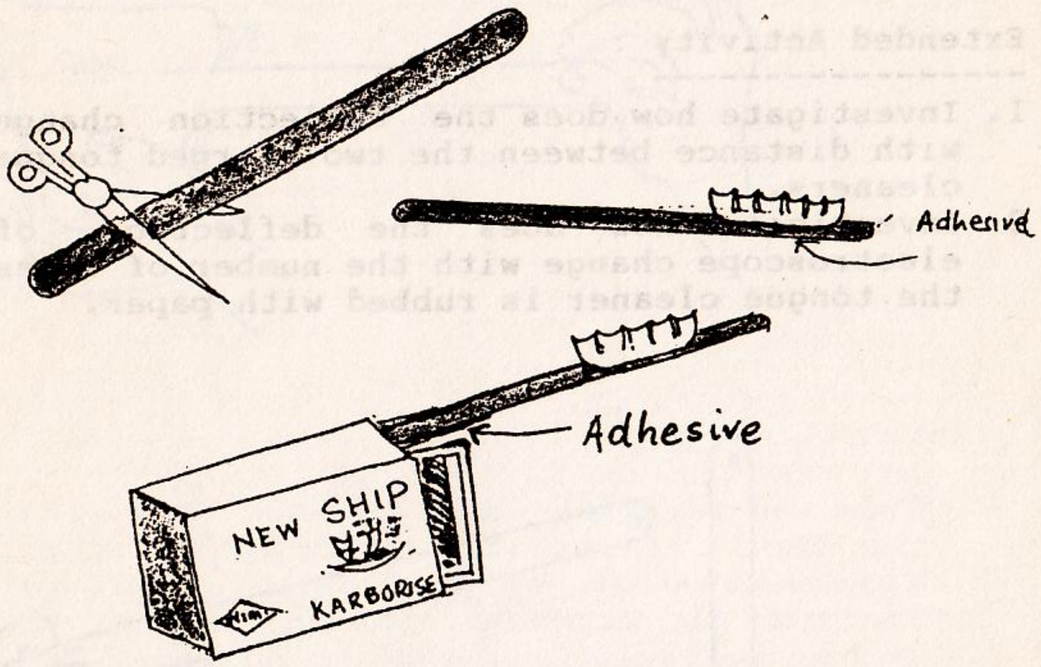
(b) Why is it so ?

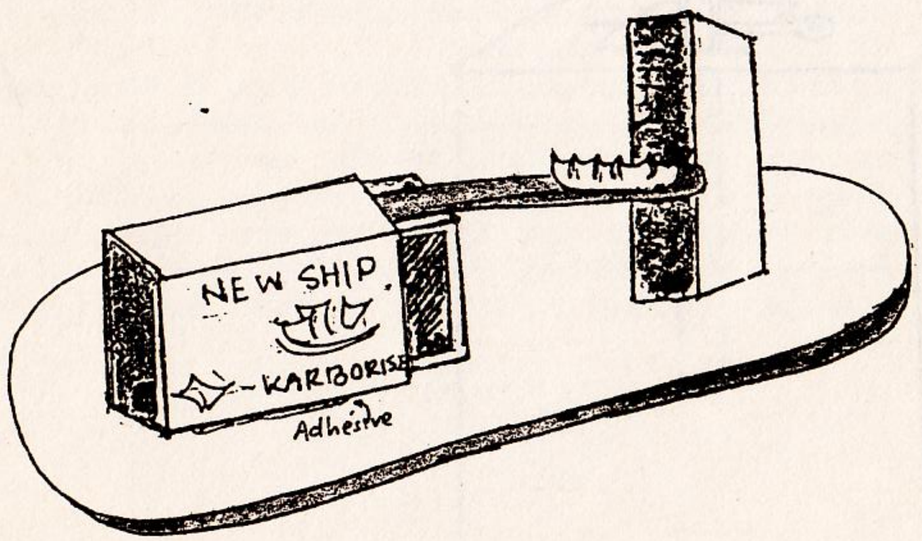
Extended Activity :

1. Investigate how does the deflection change with distance between the two charged tongue cleaners.
2. Investigate how does the deflection of electroscope change with the number of times the tongue cleaner is rubbed with paper.









ACTIVITY - 6

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full length	
2.	Match box	Empty	2
3.	Crown cap		1
4.	Chappal sole	Discarded Hawai chappal	1
5.	Adhesive/Glue		
6.	U-clips		6

Instructions :

1. Take a plastic tongue cleaner and cut it into halves.
2. Take one half and insert the other end of the plastic tongue cleaner in to the match box, length wise between the side of its cover and tray.
3. Paste the bottom of crown cap on one end of the plastic tongue cleaner with adhesive.
4. Take the rubber sole and paste the match box carrying tongue cleaner near its one end and place the second match box behind the free end of the tongue cleaner to work as a scale.
5. Place the clips successively into the crown cap.

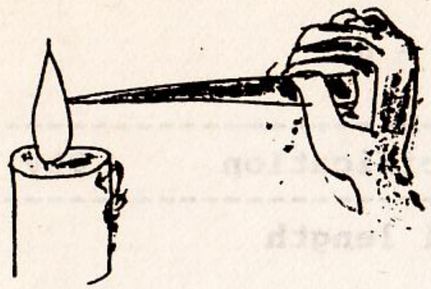
Observation :

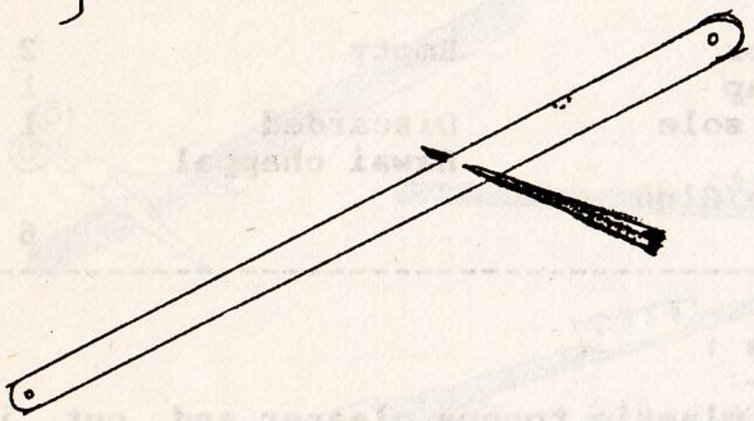
What do you observe ?

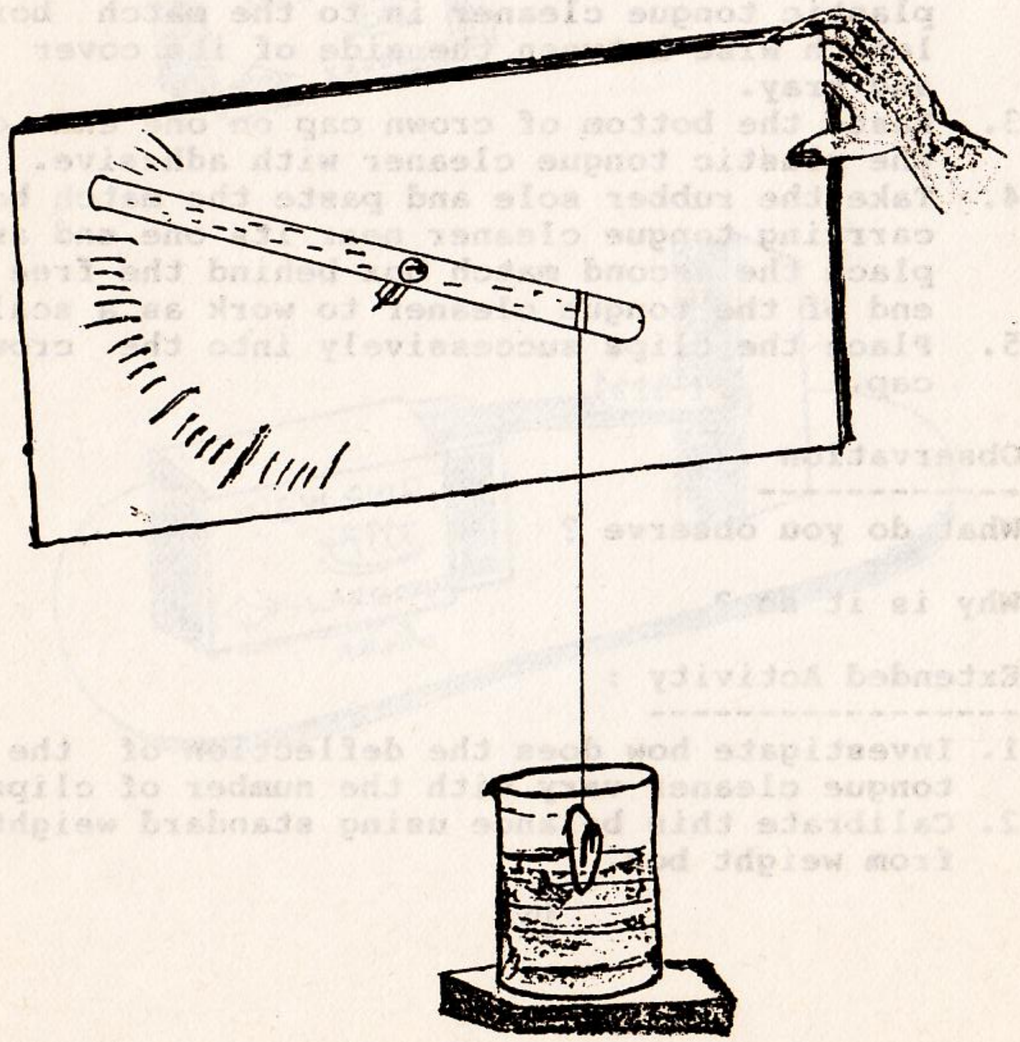
Why is it so ?

Extended Activity :

1. Investigate how does the deflection of the tongue cleaner vary with the number of clips.
2. Calibrate this balance using standard weights from weight box.







ACTIVITY - 7

S.No.	Materials	Specification	Qty.
1.	Plastic tongue cleaner	Full size	1
2.	Wooden board		
3.	Refil tube	1.5 - 2cm	1
4.	Alpin		1
5.	Darning needle		1

Instructions :

1. Take a plastic tongue cleaner and make a hole with a heated tip of a darning needle at about 1/4th its length from one end.
2. Pass a pin through the hole of the tongue cleaner and then pass the refil tube and insert the pin at about the centre of the wooden board.
3. To one end of the tongue cleaner, loop out a thread and tie a U-clip at the free end of the thread.
4. Towards the unlooped end of the tongue cleaner make markings on the board to serve as a scale.
5. Dip the U-clip in different liquid solutions.

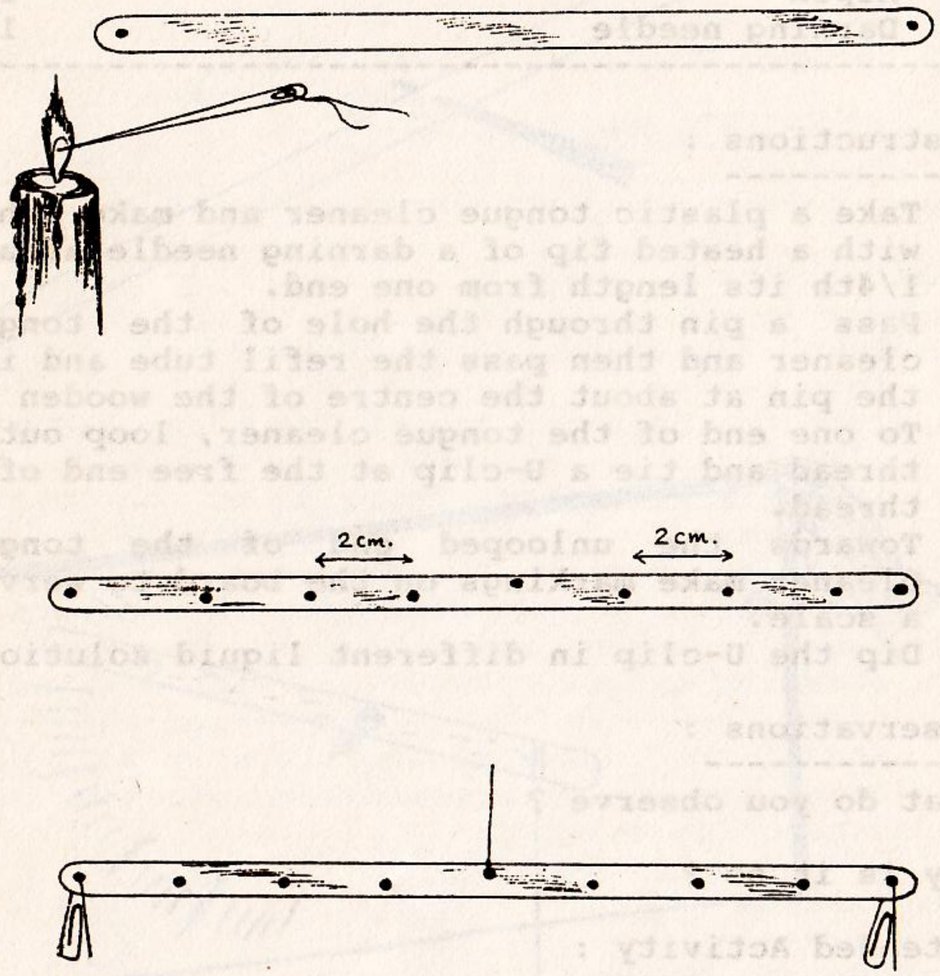
Observations :

What do you observe ?

Why is it so ?

Extended Activity :

Investigate how does the deflection of the tongue cleaner change with the concentration of common salt solution.



ACTIVITY - 8

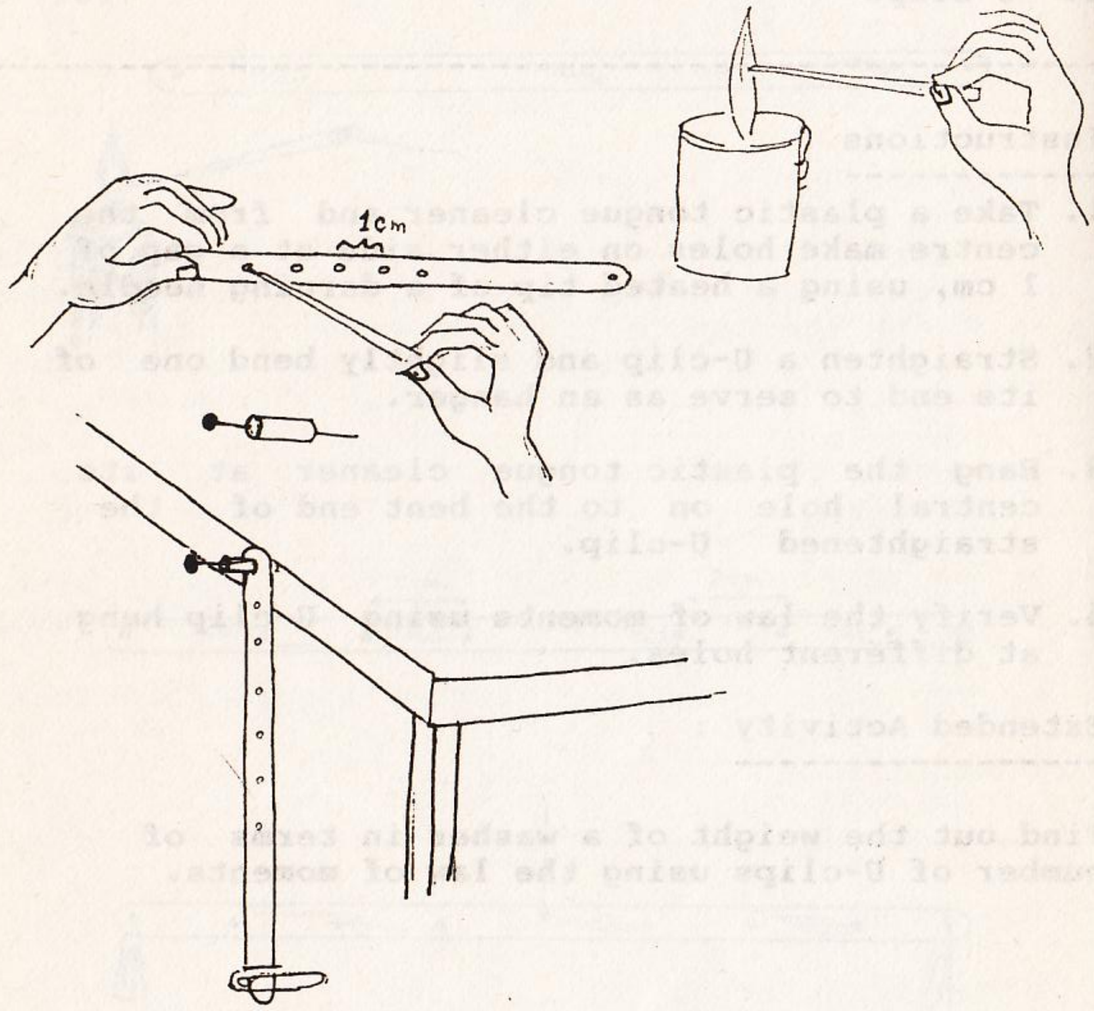
S.No.	Materials	Specifications	Qty
1.	Plastic tongue cleaner	Full size	1
2.	U-clips		10 - 12

Instructions :

1. Take a plastic tongue cleaner and from the centre make holes on either side at a gap of 1 cm, using a heated tip of a darning needle.
2. Straighten a U-clip and slightly bend one of its end to serve as an hanger.
3. Hang the plastic tongue cleaner at its central hole on to the bent end of the straightened U-clip.
4. Verify the law of moments using U-clip hung at different holes.

Extended Activity :

Find out the weight of a washer in terms of number of U-clips using the law of moments.



ACTIVITY - 9

S.No.	Materials	Specifications	Qty
1.	Plastic tongue cleaner		1
2.	Darning Needle		1
3.	Refill piece	1 to 1.5 cm	1
4.	Paper clips		6
5.	Alpin		1

Instructions :

1. Take the plastic tongue cleaner and make six holes in it separated by 1cm from one end, using a needle tip heated on a candle flame.
2. Take an alpin and pass it through the refill piece and the first hole of the plastic tongue cleaner.
3. Hammer the alpin carrying the refill piece and tongue cleaner into the side of a table.
4. Attach a paper clip at the other end of the plastic tongue cleaner.
5. Change the position of the paper clip successively by 1cm and swing the tongue cleaner.

Observation :

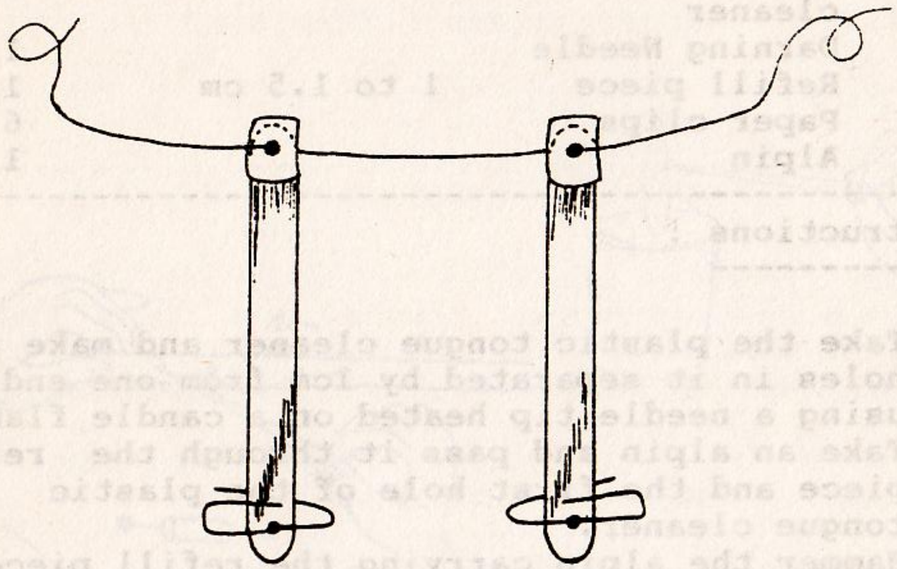
(a) What do you observe ?

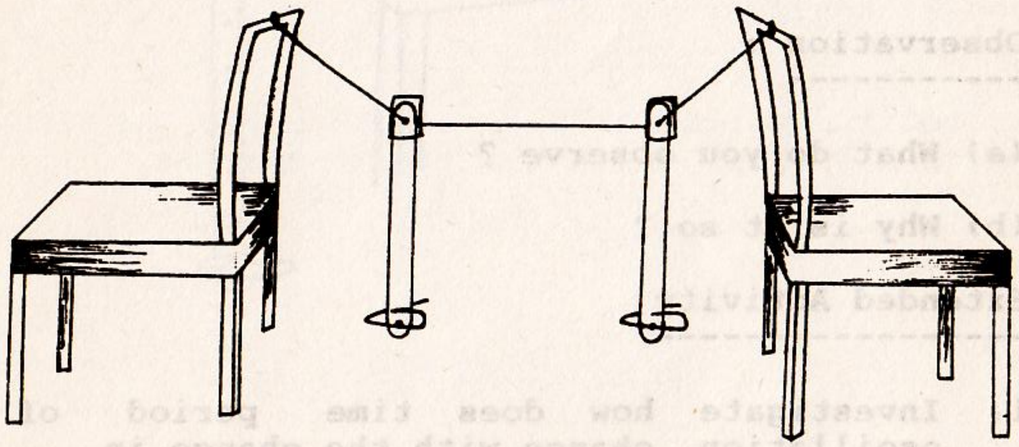
(b) Why is it so ?

Extended Activity

1. Investigate how does time period of oscillation change with the change in position of clip.

2. Investigate how does the time period change with the position of pin in different holes.





ACTIVITY - 10

S.No.	Materials	Specifications	Qty
1.	Plastic tongue cleaner	Full length	2
2.	Match box	Empty	2
3.	Cellotape		
4.	U-clips		

Instructions :

1. Take a match box and insert two tongue cleaners lengthwise between the sides of the cover and the tray.

2. Take out the tray of the second match box and attach it to the free ends of the tongue cleaner using a tape.

3. Hold the first match box near the edge of a table by pressing it down with the left hand.

4. Vibrate the tray by adding the clips successively into it.

Observations :

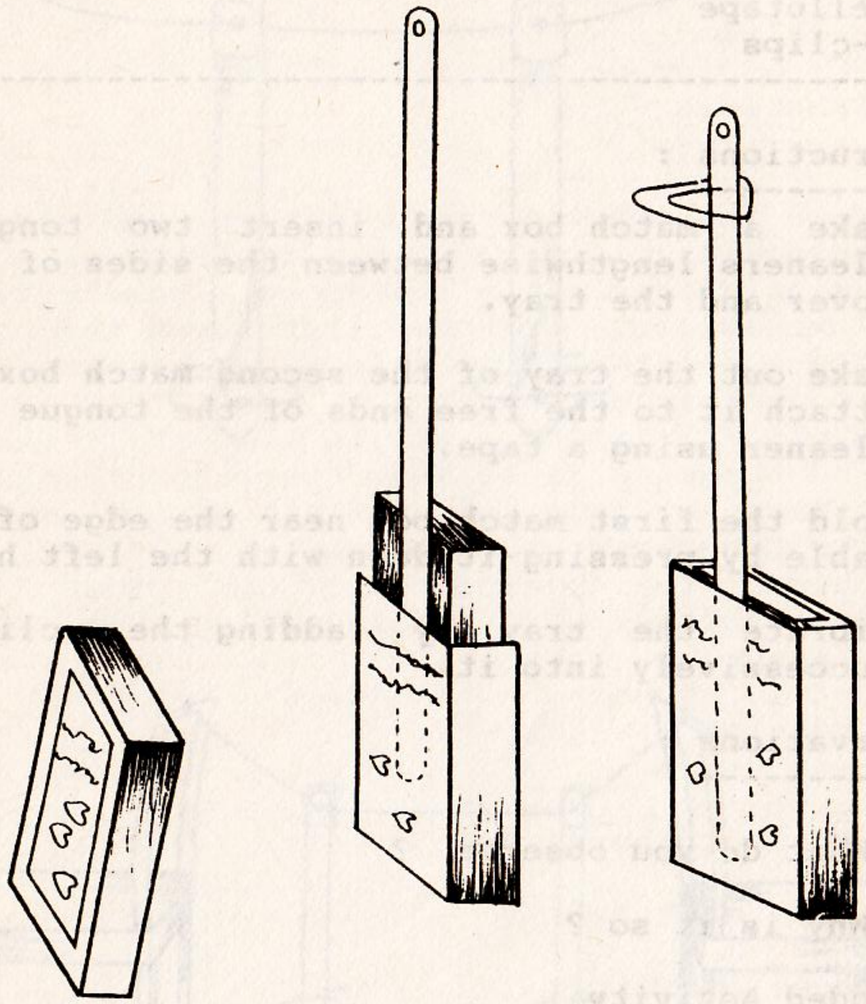
(a) What do you observe ?

(b) Why is it so ?

Extended Activity

1. Investigate how does the time period of vibration of the tray changes with the number of clips/coins ?

2. Use this balance (Inertia balance) to find out the unknown weight according to the time period of vibration.



ACTIVITY - 11

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full length	1
2.	Match Box	Empty	1
3.	Paper clips	U-shaped or Gem-shaped	6

Instructions :

1. Take a plastic tongue cleaner and insert its one end into the match box between the cover and bottom of the tray of the match box.

2. Place the match box near the edge of a Table and put 2 or 3 books on it, to secure its position.

3. At the free end of the Tongue cleaner attach paper clips successively and vibrate the tongue cleaner.

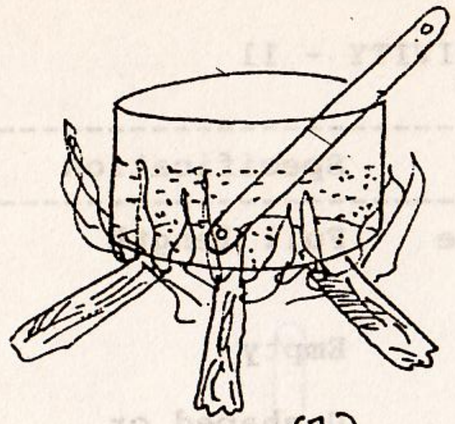
Observations :

What do you observe ?

Why is it so ?

Extended Activity :

Investigate how does the time period of vibration of tongue cleaner change with the number of paper clips attached to it.



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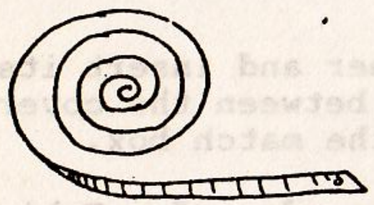

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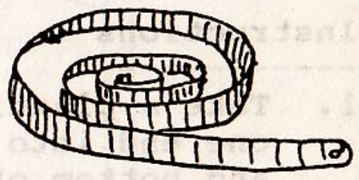

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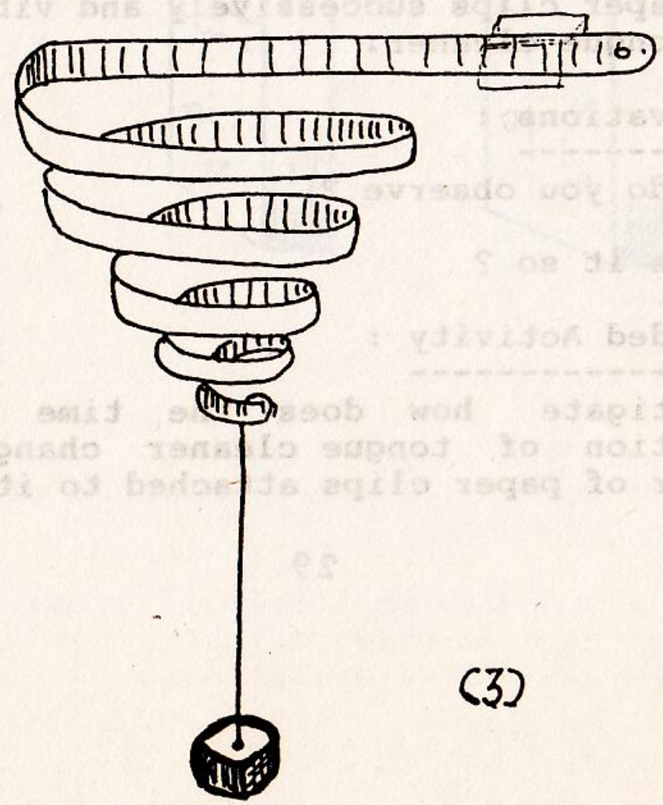


(3)

ACTIVITY - 12

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full size	1
2.	Empty bottle cap		1
3.	Clamp		1

Instructions :

1. Take a tongue cleaner and dip it into hot water to make it flexible.

2. Wind the flexible tongue cleaner as a watch spring.

3. Clamp one end of the tongue cleaner and wind a thread to the other.

4. Tie an empty bottle cap to other free end of the thread.

5. Place weights in the bottle cap.

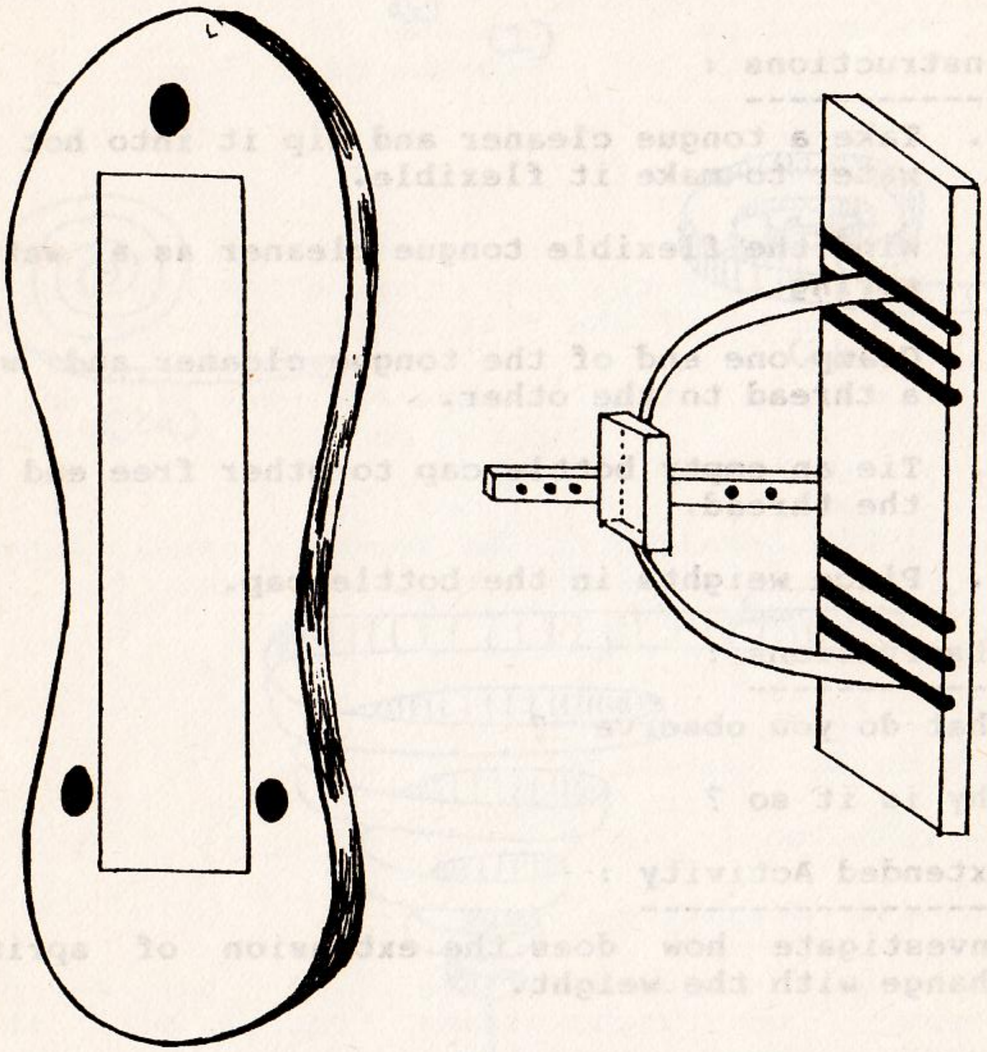
Observations :

What do you observe ?

Why is it so ?

Extended Activity :

Investigate how does the extension of spring change with the weight.



ACTIVITY - 13

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full size	2
2.	Bottle cap	Empty	1
3.	Chappal sole	Rubber	1
4.	Blade / Knife	Width and length of the half size tongue cleaner	
6.	Glue		

Instructions :

1. Take two plastic tongue cleaners. On the first affi/stick the bottle cap to act as a pan at the centre. On the second tongue cleaner, paste a strip of graph paper cut to the dimensions of the tongue cleaner.

2. Take a rubber sole and make cut (of length equal to the breadth of the tongue cleaner approximately) at one end of its length and on the other end make three cuts each separated by 1 cm.

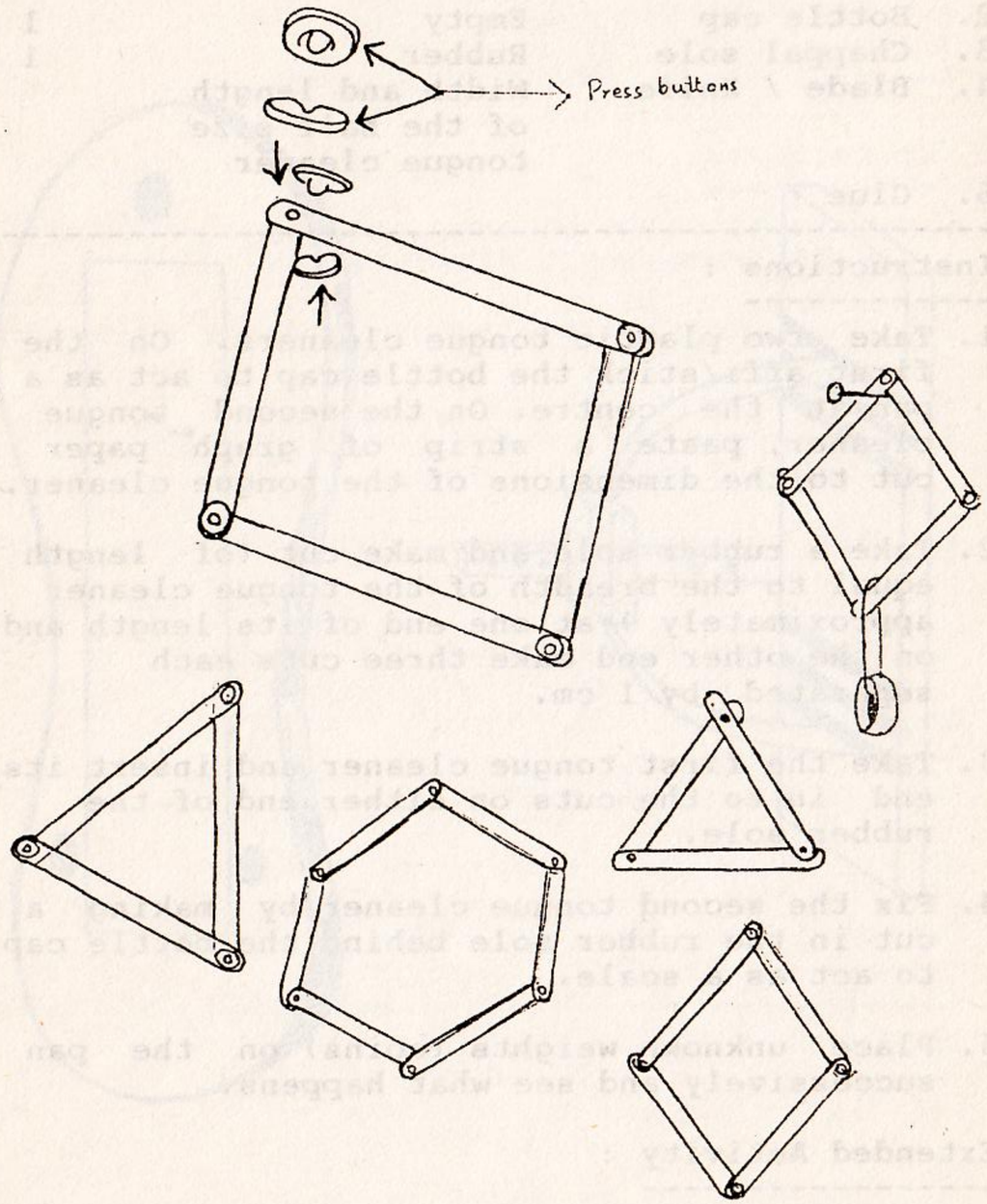
3. Take the first tongue cleaner and insert its end in to the cuts on either end of the rubber sole.

4. Fix the second tongue cleaner by making a cut in the rubber sole behind the bottle cap to act as a scale.

5. Place unknown weights (coins) on the pan successively and see what happens.

Extended Activity :

Preform the same procedure (step 5) by inserting the end of the tongue cleaner in the remaining cuts and record your observations.



ACTIVITY - 14

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full length	6
2.	Press button	small	6
3.	Thread	Sewing	25 cm
4.	U-clips	Iron ones	10

Instructions :

1. Take four plastic tongue cleaners.
2. Join them at their corner holes with press buttons to make a square figure out them.
3. Put the square structure into a nail on the wall.
4. Tie the thread to the opposite of the corner of the structure.
5. Hang U-clips successively on to the thread.

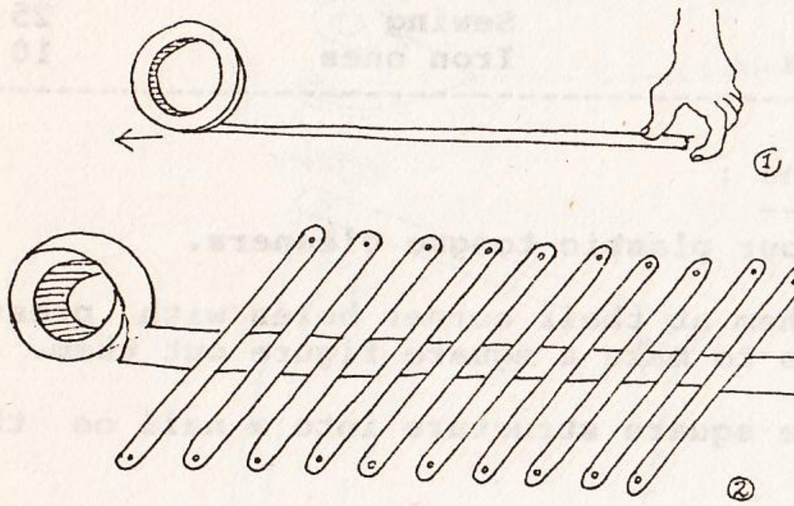
Observations :

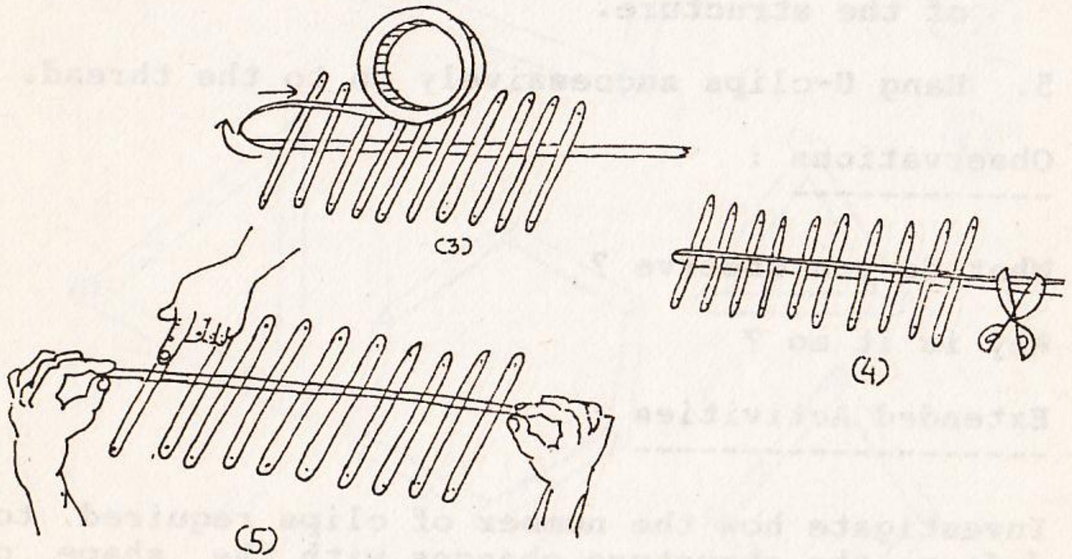
What do you observe ?

Why is it so ?

Extended Activities :

Investigate how the number of clips required to deform the structure changes with the shape of the structure.





ACTIVITY - 15

S.No.	Materials	Specification	Qty
1.	Plastic tongue	Full size	15
2.	Cellophane tape	Plastic	

Instructions :

1. Unwind the cellophane tape about 40 cm and lay it on an even surface with the adhesive side upwards.

2. Level about 5 cm of the free end and place the 15 tongue cleaner on the tape each separated by a distance of 2 cm.

3. Bring the tape back over the tongue cleaners leaving about the same length (5 cm) on the other end.

4. Press the tape on to the tongue cleners so that it sticks on to it.

5. Ask your friend to hold one end and create a disturbance by hitting slightly the first tongue cleaner at the other end.

Observations :

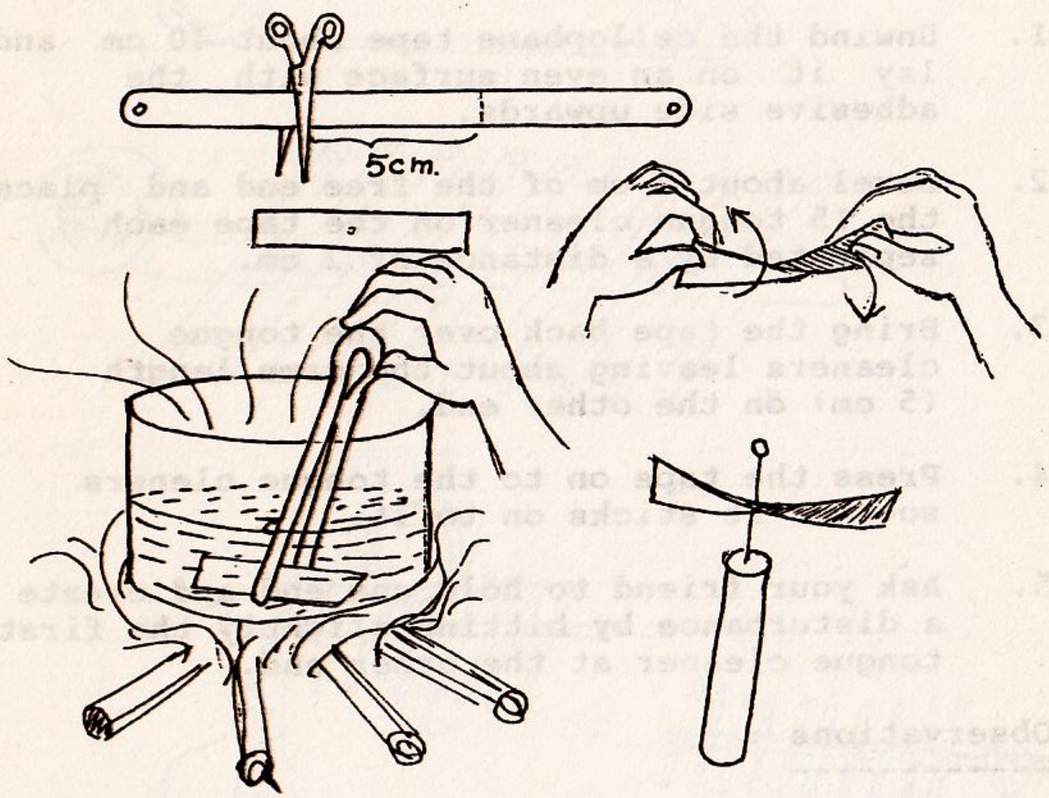
What do you observe ?

Why is it so ?

Extended Activities :

1. Investigate how does the speed of wave change with tension in the tape.

2. Investigate how does the speed of wave change with the load (clips) on the tongue cleaners.



ACTIVITY - 16

S.No.	Materials	Specification	Qty
1.	Tongue cleaner	Plastic	1
2.	Reed	10 cm long	1
3.	Alpin		1

Instructions :

1. Take the tongue cleaner and cut a five cm long piece out of it using scissors.
2. Place the tongue clener in boiling water for sometime and take it out with tongs.
3. Hold the two diagonally opposite corners between the thumb and first finger and twist them inwardly. It has become and air foil now.
4. Make a hole at the plastic tongue cleaner using a needle whose tip is heated on candle flame.
5. Pass the alpin through the hole of the tongue cleaner piece.
6. Poke the tip of alpin in the end of the reed.
7. Blow over the foil.

Observations :

What do you observe ?

Why is it so ?

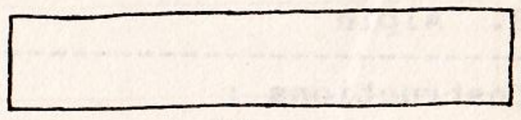
Extended Activity :

1. Investigate how the speed of rotation of air foil changes with the speed with which you run.

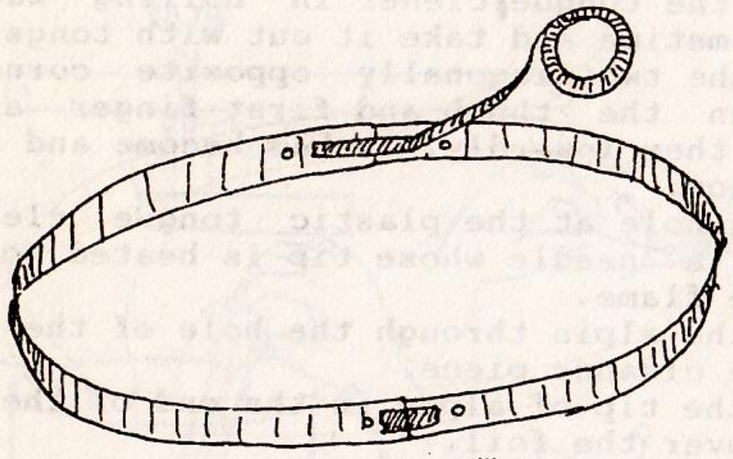
2. Investigate how the speed of the air foil changes with distane from the fan.

3. Compare the range of air circulation of different fans with the help of air foil.

(ii)



(i)



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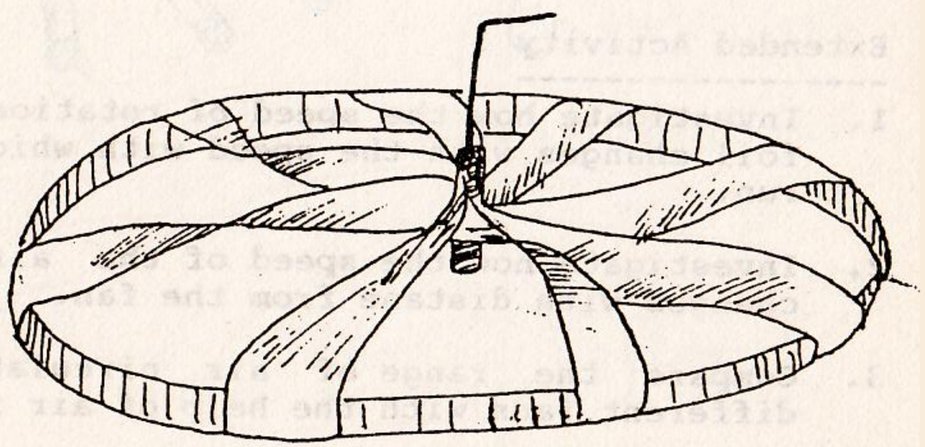


(iv)

ACTIVITY - 17

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full size	2
2.	Cellophane tape	--	-
3.	Paper strips	--	10-15
4.	'U' clip	--	1

Instructions :

1. Take two tongue cleaner and join the ends of the tongue cleaner with a cellophane tape to give it a circular shape.
2. Fold a strip of paper in the shape of tube and place it upright at the centre of the circle.
3. Spiral the strip of paper by giving a twist and paste one end of it on the spiral tube and the other on the tongue cleaner leaving about 1 cm gap between each spiral.
4. Insert a straightened 'U' clip with the one end bend into the paper tube and place the spiral in a current of air.

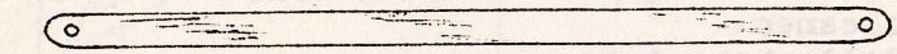
Observation :

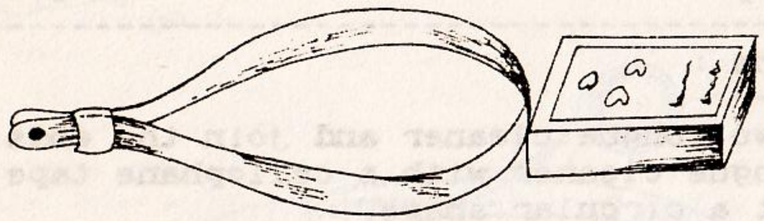
What do you observe ?

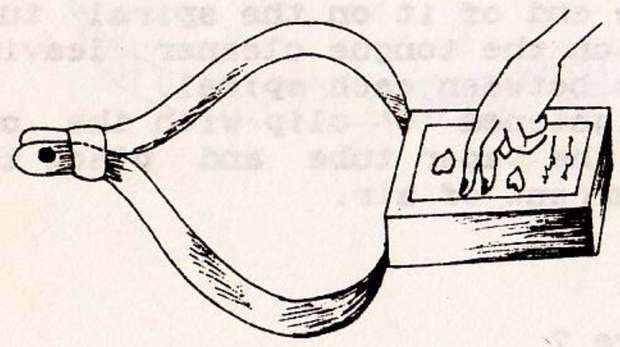
Why is it so ?

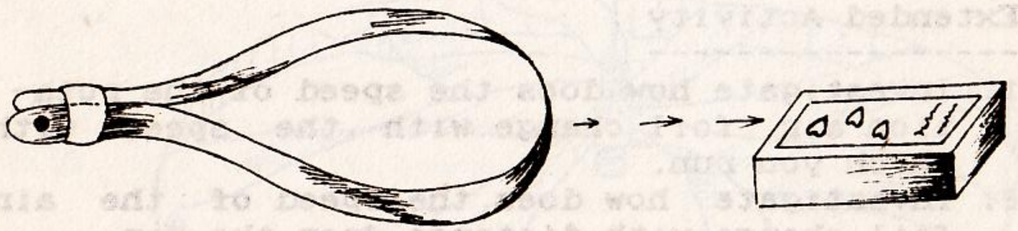
Extended Activity :

1. Investigate how does the speed of the rotation air foil change with the speed with which you run.
2. Investigate how does the speed of the air foil change with distance from the fan.
3. Compare the range of air circulation of different fans with the help of air foil.









ACTIVITY - 18

S.No.	Materials	Specification	Qty
1.	Plastic tongue	Full size	1
2.	Match box	Empty	1
3.	Thread		

Instructions :

1. Take a tongue cleaner and bring both the ends together and tie them together using a thread.

2. Place the tongue cleaner on an even surface and make equidistant marks on the surface,towards the concave bend of the tongue cleaner.

3. Place the match box on the convex bend and apply a thrust on the match box so that the tongue cleaner is brought to the first mark.Release the thrust.

4. Repeat the above for the other marks.

Observations :

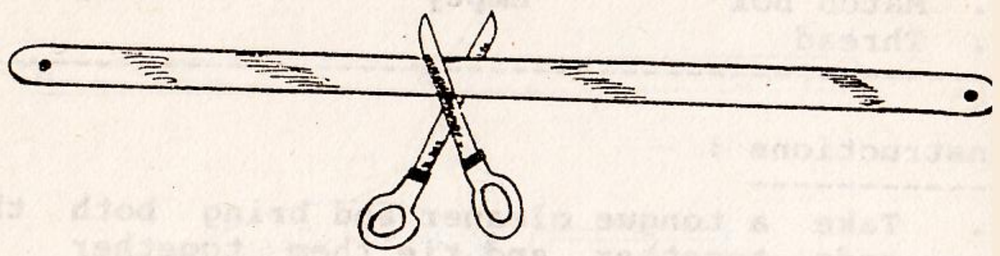
What do you observe ?

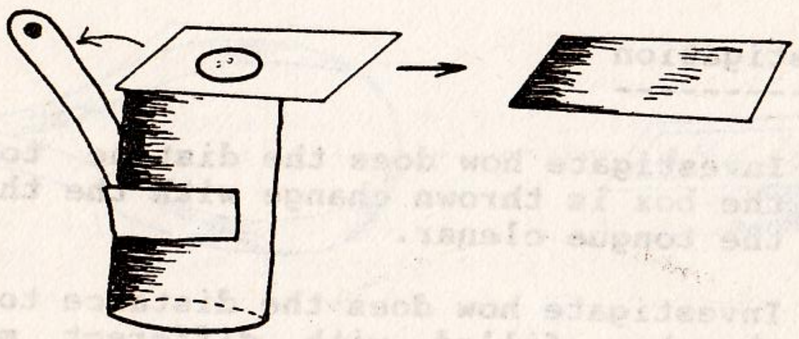
Why is it so ?

Investigation :

1. Investigate how does the distane to which the box is thrown change with the thrust of the tongue clenar.

2. Investigate how does the distance to which the box filled with different materials is thrown changes, when a thrust applied.





ACTIVITY - 19

S.No.	Materials	Specifications	Qty
1.	Tongue cleaner	Plastic	1
2.	Can	Small plastic tin	1
3.	Tape	Scotch tape 4 cm	1
4.	Cardboard	Square, slightly bigger than the face of the can	

Instructions :

1. Take the tongue cleaner and cut a piece out of it, which is one fourth its length.
2. Tape one of the tongue cleaner piece on the curved surface of the can with a small portion of it protruding up.
3. Place the cardboard piece on the top face of the can.
4. Put a one-rupee coin on the cardboard.
5. Put the protuding tip of the tongue cleaner backward and make the cardboard piece hit the tongue cleaner.
6. Leave the tongue cleaner suddenly.

Observations :

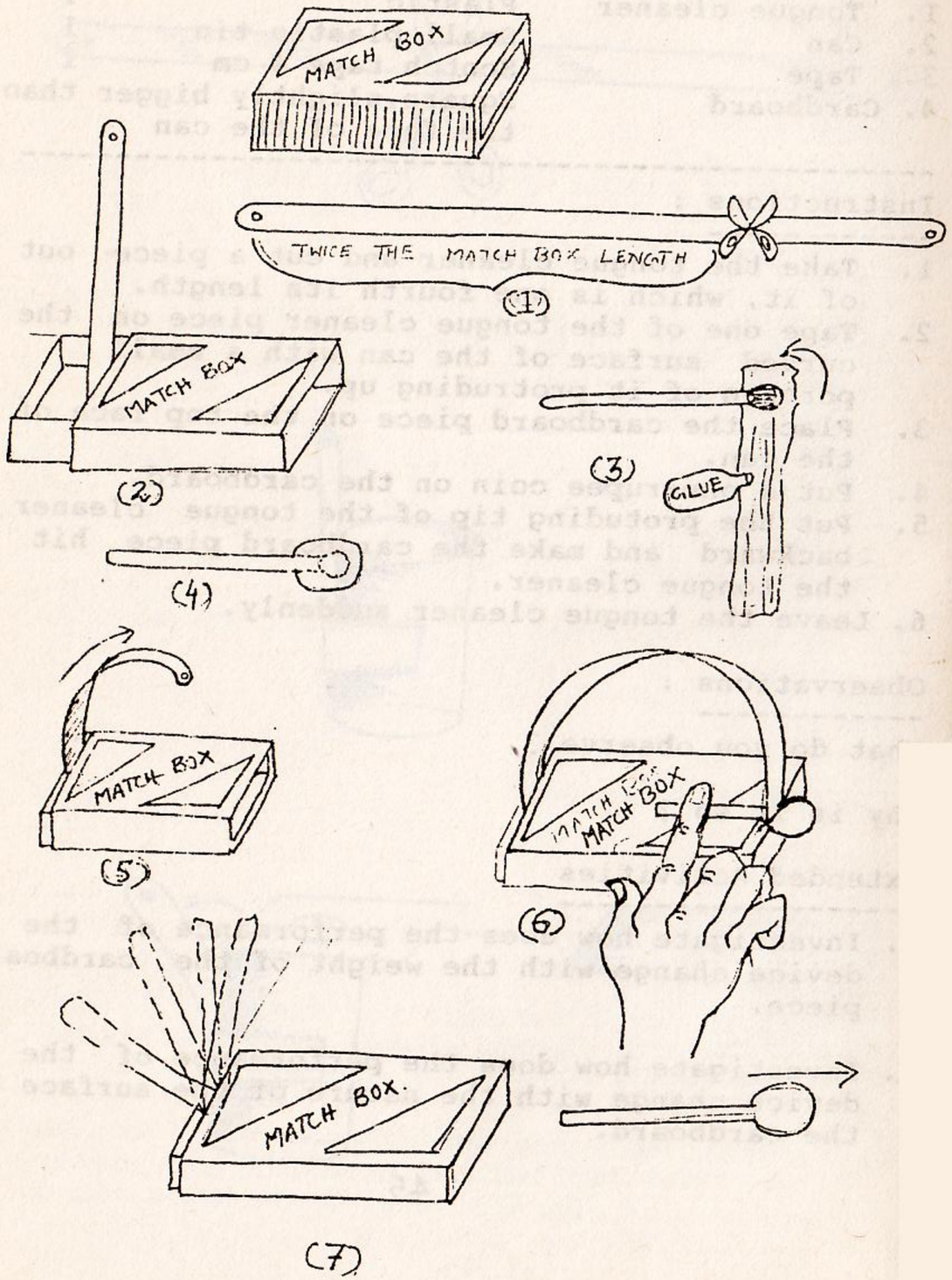
What do you observe ?

Why is it so ?

Extended Activities

1. Investigate how does the performance of the device change with the weight of the cardboard piece.

2. Investigate how does the performance of the device change with the nature of the surface of the cardboard.



ACTIVITY - 20

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full length	1
2.	Match box	Empty	1
3.	Paper	Strip 20 cm x0.2 cm	1
4.	Glue		
5.	Match stick		1

Instructions :

1. Take a tongue cleaner and cut a piece out of it,equal to twice the length of match box.
2. Take the match stick and wrap around it paper strip with the glue to secure its position.
3. Place one end of the tongue clenaer piece into box and close it as shown.
4. Place the match stick on the end of the top surface of the match box and hold there by placing your finger on it.
5. Bend the free end of the tongue cleaner to rest it against the wrapped paper strip on the match stick.
6. Remove you finger suddenly from the match stick.

Observations :

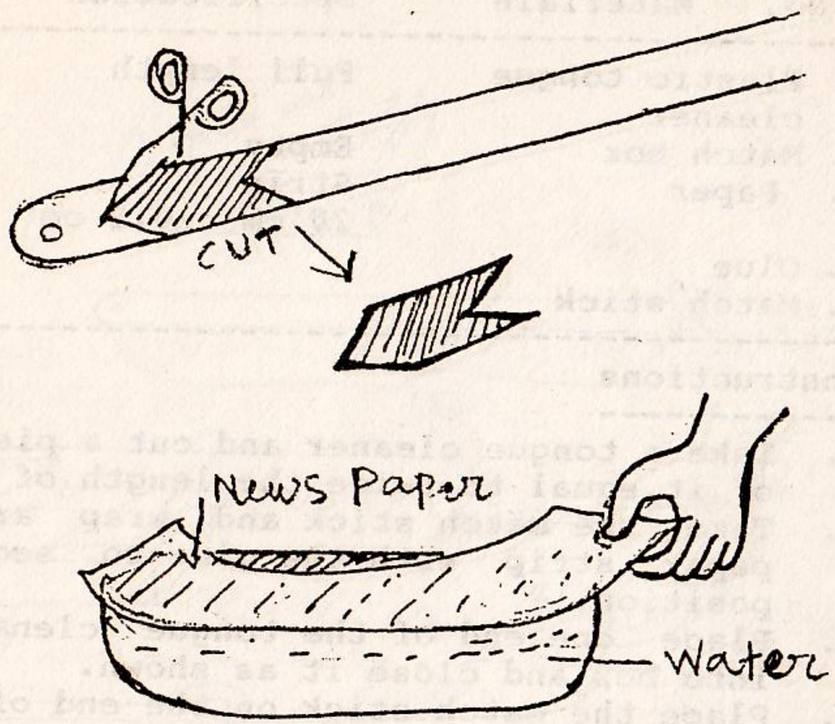
What do you observe ?

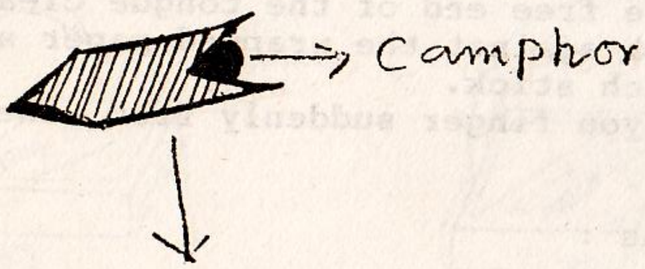
Why is it so ?

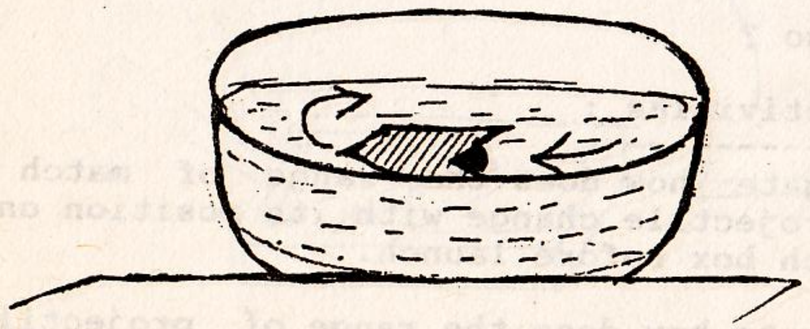
Extended Activities :

1. Investigate how does the range of match stick projectile change with its position on the match box before launch.

2. Investigate how does the range of projectile change with distance.







ACTIVITY - 21

S.No.	Materials	Specifications	Qty
1.	Tongue cleaner	Plastic	1
2.	Camphor	Cube	1
3.	Trough	Plastic	1

Instructions :

1. Take the plastic tongue cleaner and cut 2 cm long piece out of it with v-cuts.
2. Fill the trough or bucket with water. Spread a piece of newspaper on the surface. Remove the paper. It will soak away all the oil on the water surface, if any.
3. Fix the camphor cube into the v-cut of the plastic tongue cleaner piece.
4. Place the plastic tongue cleaner piece on the water surface.

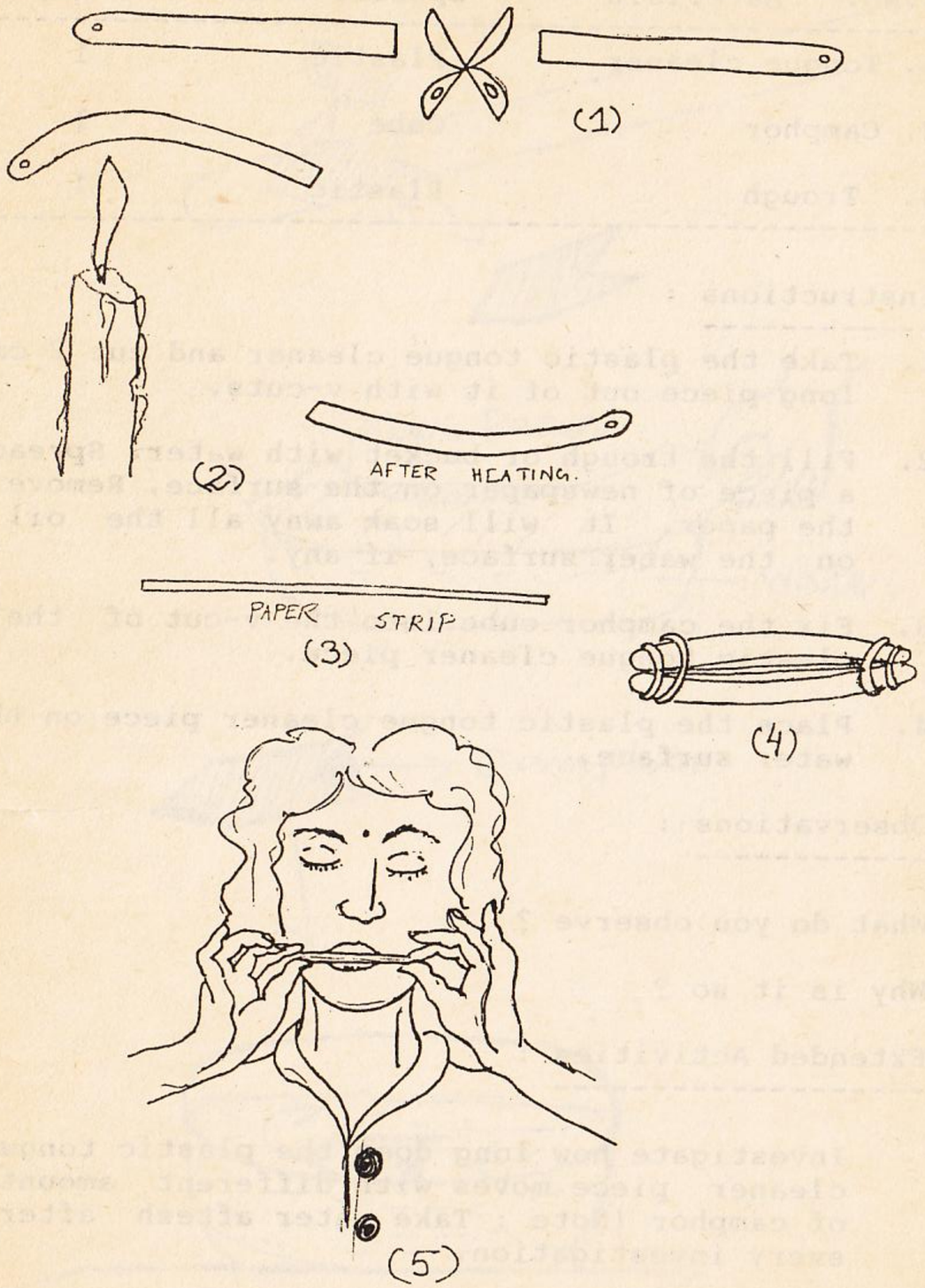
Observations :

What do you observe ?

Why is it so ?

Extended Activities :

Investigate how long does the plastic tongue cleaner piece moves with different amounts of camphor (Note : Take water aftesh after every investigation.



ACTIVITY - 22

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full size	1
2.	Paper strip		1
3.	Rubber band thread		1

Instructions :

1. Take a tongue cleaner and cut it into halves.

2. Heat both the halves of the tongue cleaner on the flame of a candle to give it a slight kink/bend.

3. Place a thin paper strip between the bent surface of the tongue cleaner and wind both the ends with rubber band/thread.

4. Place the tongue cleaner between your lips and blow air into it.

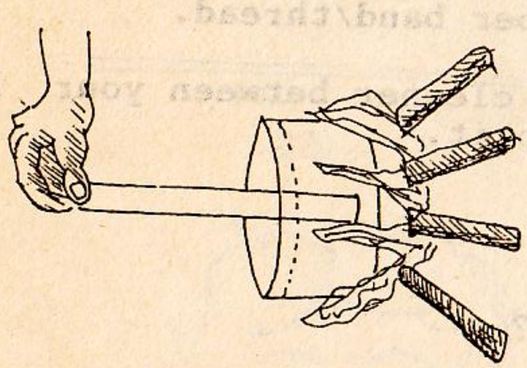
Observations :

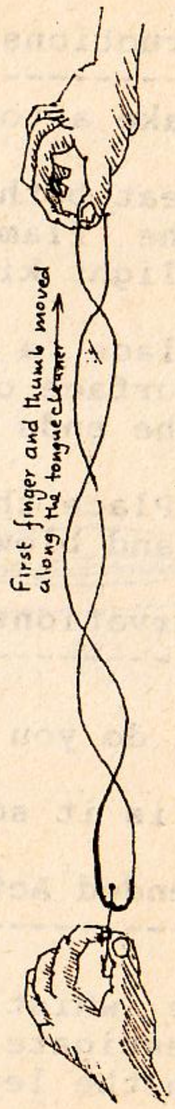
What do you observe ?

Why is it so ?

Extended Activity :

Make whistles of different lengths and investigate how does the nature of sound change with the length.





ACTIVITY - 23

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full length	1
2.	Thread	Sewing	10 cm

Instructions :

1. Take the plastic tongue cleaner and place it in boiling water for sometime to soften it.

2. Hold one end of the hot tongue cleaner in one hand and quickly twist it from the other end so that kinks are formed on the tongue cleaner.

3. Tie the thread to the hole at one end of the tongue cleaner.

4. Hold the plastic tongue cleaner near the thread between the fingers of your thumb and first finger.

5. Move the first finger and the thumb along the tongue cleaner.

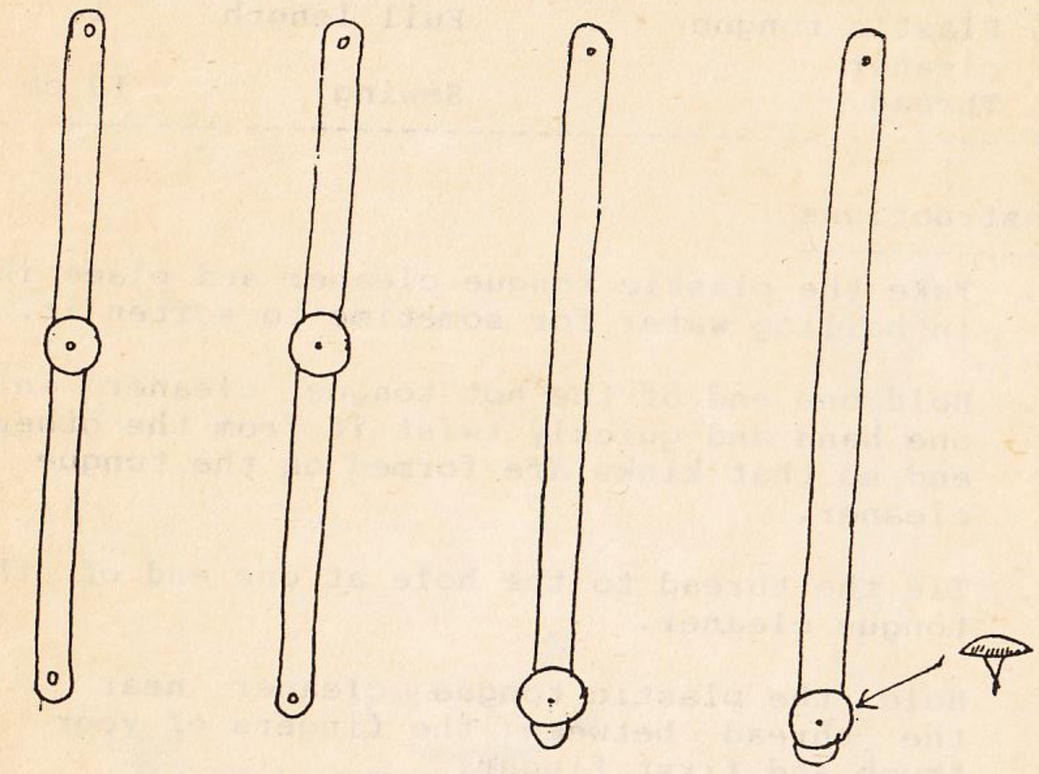
Observations :

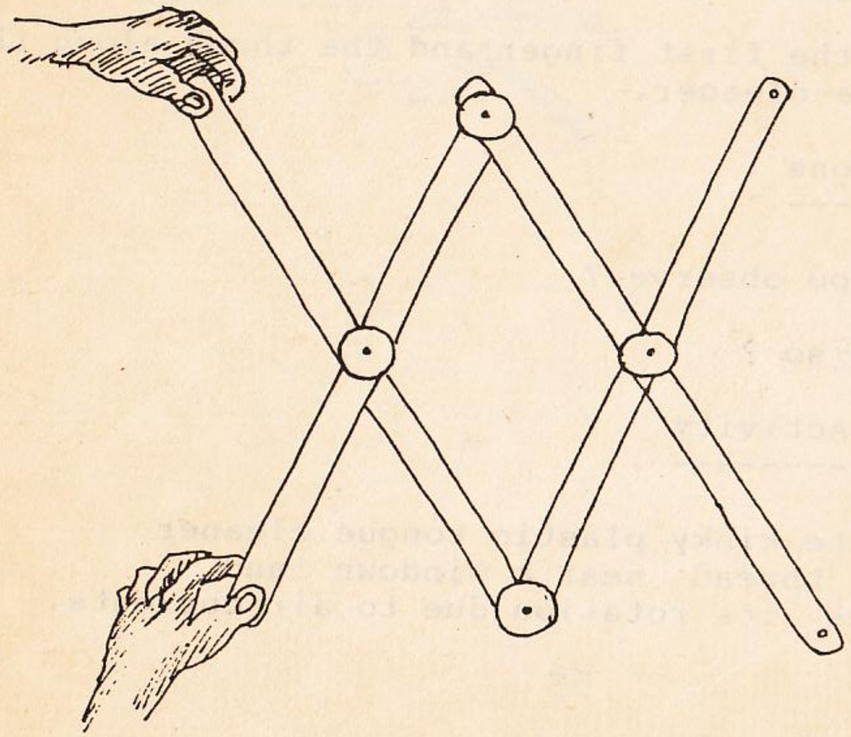
What do you observe ?

Why is it so ?

Extended Activity

Hang the kinky plastic tongue cleaner along thread near a windown and observe its rotation due to air currents.





ACTIVITY - 24

S.No.	Materials	Specification	Qty
1.	Plastic tongue cleaner	Full size	4
2.	Drawing pin		4

Instructions :

1. Take four plastic tongue cleaners and make hole at its centre using a heated tip of a darning needle.

2. Take two of the tongue cleaner at a time and pass a drawing pin through their centres. Fix the two free ends of the crossed structure with drawing pins.

3. Hold two free end of the tongue cleaner and bring them close to one another and move them away from one another.

Observation :

What do you observe ?

Why is it so ?

Extended Activity :

Investigate how does the forward extension of the system change with the distance by which the first two tongue cleaners are moved inwardly.

APPENDIX - I

A Resource Centre for Developing Low-cost Teaching Aids in Science And Mathematics
(A Project sanctioned By Ministry of Human Resource Development, Govt.of India, New Delhi)

Introduction:

Today, Science has become synonymous with fancy glassware and expensive laboratories. The learning of science is being equated with an ability to mug up definitions and formulae without much realising their relevance in day to day life.

Experimental or activity based science plays less and less role in the curriculum, on the grounds that there is not enough time for it, if all the subject matter is to be COVERED (forgetting that the real task of education is to UNCOVER THINGS). The principal hinderance in adopting this approach is procrastination or inertia.

"The more sophisticated the technology,the more complex it becomes to use it in Education". - Statement from UGC.

For creative science teaching/learning, children should be provided opportunities to have first hand science experiences, investigate problems, make their own hyptheses and draw their own conclusions. This can be achieved with limited financial resources for school by assembling a large variety of waste or scrap materials (like bamboo, empty match boxes, crates, used bicycle spoke, fused bulbs, shells, seeds, thorns, used cigarette boxes, ball bearings etc or low-cost materials (like bicycle valve tube, torch bulb, wire, plastic tube, match stick, rubber band, nails etc.) which are available either at home or in the community. The main thing about scrap is that children can use it freely without adult admonishment.

The philosophy behind adopting this approach is that such kits being within the average experience of the child are easily acceptable and tend to make science an integral part of the child's experiences. The use of such self asembled kits also encourages the children to carry out experiments outside the school. Children also provide ideas for improving the kits, find new uses (Well confirmed by Hoshangabad Science Teaching Programme of Eklavya going on in almost 400 schools of Madhya Pradesh since last 20 years.)

Philosophy:

The programme is being carried out with a credo and philosophy of an ancient poet who said:

" go in search of your people, love them,

learn from them, plan with them,

begin with what they know, built on what

they have."

Objectives:

1. To interact and communicate with the rural/urban teachers in understanding the problems of education in their schools.

2. To involve the rural/urban teachers in developing teaching aids, relevant to their own environment which can be made within the meagre annual budget of the school.

3. To use the local resources such as the local artisans, craftsmen, potters, carpenters,iron smiths, electrician, bicycle repair mechanic etc and the materials which is no cost/low cost for the development of teaching aids.

4. To set up a workshop for making wooden, metallic and other teaching aids where teachers, students and other interested persons will have easy access to carry out things.

5. To understand the methodology of interacting and involving both the rural / urban teachers and artisans to prepare aids within a short span of 10 days with as much flexibility and openness as possible.

6. To develop a place first of its kind in the country where all the above mentioned efforts will be continued by all those who are interested in school level education and bring out a Resource book, for science teachers at the middle school level, with an evolving nature.

Guidelines:

For the development of appropriate and low-cost aids for science teaching:

Teaching aids at the initial level should emphasize the development of
PROCESS SKILLS.
Example : Observing, Predicting, Classifying, Hypothesizing,Measuring, experimenting,Inferring, Control of variables.

COMMUNICATION SKILLS
Example : Observational drawing,Recording data in tables,Simple graphs, Interpreting data and development of

SCIENTIFIC ATTITUDES
Example : Curiosity,Suspended judgement, Originality,Honesty, Open mindedness,Objectivity, Care of environment.

Definition of Terms:

Low cost/No cost: Can be prepared by the teacher/students from materials found in the local environment or the materials can be bought without needing special financial assistance.

Teaching aid: A device to be used by the teacher/student to facilitate the learning of the processes of science and to develop scientific concepts and attitudes. Such a device may be improvised from either indigenous materials or from simple, inexpensive, commercially produced items.

Appropriate: Educationally sound,effective, suited to the learning abilities of children at the elementary level.

Guidelines for Development:

a) Materials for constructing the aids should be readily available.

b) the aid should be -

relevant and appropriate (to the learners as well as the concept/skill to be taught); economical, in terms of time for construction, cost involved and effort required to make it scientifically correct; clear in size, layout and proportion, attractive to users, safe and easy to handle, durable and easy to maintain and store.

In the process of development of teaching aids, the following factors shouldn't be overlooked:

Identification of the needs, try-out of the aid in real classroom situation, evaluation of its effectiveness; changes and modifications leading to its finalization.

Lastly teaching aids should not be developed for the sake of making teaching aids. They should be developed to serve an identified need.

Status of the Project:

The work of the project started from 15th November 1991 and the sanctioned amount is nearly Rs. 2 Lakhs per year and includes the salary of the Project staff(5). It is for three years in the begining.

Dr.Lalit Kishore, 1991, Hari Om Ashram Prerit, Teaching aids award winner and recepient of many other distinguished National (NCSTC) and International (CASTME) awards, joined as the Director of the project from 1st Nov.1992, on deputation from Kendriya Vidyalaya Sangathana, initially for a period of two years.

Shri P.K. Srinivasan,an eminent Maths educationist has agreed to act as a consultant for the project and in February 1992 and March 1993 has conducted two MATH EXPOSITIONS in the school involving students from class II to XI and a work-shop for Science and Maths teachers.

We have developed some interesting material, which is soon going to be published in the form of small booklets.

1. Teaching resource material for Primary level Maths(5-8 Years)
2. 25 Activities in Science with Rubber bands.
3. 25 Activities in Science with Plastic Tongue cleaners.
4. 20 Activities in Science with Reeds.
5. 25 Activities in Science with Plastic straws.
6. 12 Weighing devices (different types.)
7. 20 Experiments with contents of Geometry box.

Resource material under preparation:

1. Activities with Paper.
2. Making Geometric solids and Flexagons.
3. Mathematics without Blackboard
   (Pre-primary to Class VI)
4. Activities in Science (Curriculum based)
   VI,VII and VIII
5. Activities in Maths (Curriculum based)
   VI,VII and VIII
6. Activities with Crown caps.
7. Activities with discarded Shaving blades.
8. Activities with Plastic combs.
9. Improvised apparatus for Upper primary Science.

Data base of

a. Resource persons and their addresses.
b. Books and Journals in Science.
c. Books and Journals in Mathematics.
d. Books and Journals in Education.
e. Books and Journals in Environment.

Also we are looking forward to :

1. Resource persons already involved in similar work, their addresses and other details.
2. Any relevant publications (Indian/Foreign)
3. Books (Textbooks/Reference)
4. Newsletters.
5. Coloured or B/W Slides-with audio tape etc.
6. Video cassettes.
7. Audio cassettes.
8. Any simple,multipurpose kit or Do-it-yourself kit (tried ones)
9. Any particular place(s) that you suggest, where we must visit.
10. Anything else that you wish,we should do or pursue in this Project.

Existing aids are being prepared and tried out in our school and more new ideas and information are sought. The reader if aware, is requested to send the details.

Any comments, suggestions are welcome at any time and anyone who is genuinely interested in carrying out such work can visit Rajghat Besant School, KFI,Rajghat Fort, Varanasi.

* * * The Resource centre has won the **IIIrd Prize** for the entry
" Pre-Physics Experience Kit "
in All India contest for Hari Om Ashram Prerit Dr.K.R.Ramanathan Teaching Aid Awards,1992 organised by the Indian Physics Association held at the Department of Physics,Barkatullah University,Bhopal(M.P.) on 22nd,March,1993.

APPENDIX - II

Dear Reader,

Hope you have read the booklet or implemented the activities for classroom instruction. We will be glad to receive your critical appraisal of the activities. Please fill in the following proforma and send it to us so that we can improve the resource material.

Thanks a lot for the cooperation.

Resource Centre,
LCTA-MHRD Project,
Krishnamurti Foundation India,
Rajghat Fort,Varanasi(U.P.)
PIN : 221 001

PROFORMA

1. Name :

2. Address :

3. Teaching experience :

4. Other experience :

5. Are the activities suitable for providing the middle school students the experiences in the processes of science ?
   a) To a great extent [ ]
   b) To a good extent [ ]
   c) To some extent [ ]

6. In your opinion,these activities can be performed by students
   a) Quite easily [ ]
   b) With little preparation & guidance [ ]
   c) Not at all [ ]

7. Your suggestions for the improvement of the material.

जब मैं बच्चा था, मुझे फालतू चीजों से खिलौने बनाने और अपनी कल्पना से खेल ईजाद करने की आजादी थी। मेरे आनंद में मेरे साथियों की पूरी हिस्सेदारी थी; सच तो यह है कि मेरे खेलों का पूरा मजा मेरे साथियों की हिस्सेदारी पर निर्भर था। एक दिन हमारे बचपन के स्वर्ग में वयस्कों की व्यावसायिक दुनिया के एक प्रलोभन ने प्रवेश किया। हमारे एक साथी को किसी विलायती दुकान से लाया गया खिलौना दिया गया। खिलौना अद्वितीय था—खूब बड़ा और सजीव। हमारे साथी में खिलौने का घमंड आ गया; खेल से उसका मन कुछ हट गया। उस महँगी चीज को वह हमसे सावधानीपूर्वक बचाकर रखने लगा—उसके पूर्ण स्वामित्व में मस्त होकर खुद को अपने साथियों से श्रेष्ठ समझने लगा क्योंकि हमारे खिलौने सस्ते थे। इस प्रलोभन ने एक ऐसी चीज को ढाँप दिया जो खिलौने से ज्यादा अद्वितीय थी—एक आदर्श बच्चे की झलक को।

—रवींद्रनाथ ठाकुर